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GEOGRAPHICAL BOUNDARIES—I.*

BY

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Nature abhors fixed boundary lines and sudden transitions; all her forces combine against them. Everywhere she keeps her borders melting, wavering, advancing, retreating. If by some cataclysm sharp lines of demarcation are drawn, she straightway begins to blur them by creating intermediate forms, and thus establishes the boundary zone which characterizes the inanimate and animate world. A stratum of limestone or sandstone, when brought into contact with a glowing mass of igneous rock, undergoes various changes due to the penetrating heat of the volcanic outflow, so that its surface is metamorphosed as far as that heat reaches. The granite cliff slowly deposits at its base a rock-waste slope to soften the sudden transition from its perpendicular surface to the level plain at its feet. The line where a land-born river meets the sea tends to become a sandbar or a delta, created by the river-borne silt and the wash of the waves, a form intermediate between land and sea, bearing the stamp of each, fluid in its outlines, ever growing by the persistent accumulation of mud, though ever subject to inundation and destruction by the waters which made it. The alluvial coastal hems that edge all shallow seas are such border zones, reflecting in their flat, low surfaces the dead level of the ocean, in their composition the solid substance of the land; but in the miniature waves imprinted on the sands and the billows of heaped-up boulders, the master workman of the deep leaves his trademark.

* This article is a chapter from a work in preparation on the Influences of Geographic Environment, based upon Friedrich Ratzel's System of Anthropogeography.

Under examination, even our familiar term coastline proves to be only an abstraction with no corresponding reality in nature. Everywhere, whether on margin of lake or gulf, the actual phenomenon is a coast zone, alternately covered and abandoned by the waters, varying in width from a few inches to a few miles, according to the slope of the land, the range of the tide and the direction of the wind. It has one breadth at the minimum or neap tide, but increases often two or three fold at spring tide, when the distance between ebb and flood is at its maximum. At the mouth of Cook's Inlet on the southern Alaskan coast, where the range of tides is only eight feet, the zone is comparatively narrow, but widens rapidly towards the head of the inlet, where the tide rises twenty-three feet above the ebb line, and even to sixty-five feet under the influence of a heavy southwest storm. On flat coasts we are familiar with the wide frontier of salt marshes, that witness the border warfare of land and sea, alternate invasion and retreat. In low-shored estuaries like those of northern Brittany and northwestern Alaska, this amphibian girdle of the land expands to a width of four miles, while on the precipitous coasts of enclosed sea basins it contracts to a few inches. Hence this boundary zone changes with every impulse of the mobile sea and with every varying configuration of the shore. Movement and external conditions are the factors in its creation. They make something that is only partially akin to the two contiguous forms. Here on their outer margins land and ocean compromise their physical differences, and this by a law which runs through animate and inanimate nature. Wherever one body comes into constant contact with another, it is subjected to modifying influences which differentiate its periphery from its interior, lend it a transitional character, make of it a penumbra between light and shadow. The modifying process goes on persistently with varying force and creates a shifting, changing border zone which, from its nature, cannot be delimited. For convenience' sake, we adopt the abstraction of a boundary line; but the reality behind this abstraction is the important thing in anthropogeography.

All so-called boundary lines with which geography has to do have this same character,—coastlines, river margins, ice or snow lines, limits of vegetation, boundaries of races or religions or civilizations, frontiers of states. They are all the same, stamped by the eternal flux of nature. Beyond the solid ice-pack which surrounds the North Pole is a wide girdle of almost unbroken drift ice, and beyond this is an irregular concentric zone of scattered icebergs which varies in breadth with season, wind and local current; a

persistent decrease in continuity from solid pack to open sea. The line of perpetual snow on high mountains advances or retreats from season to season, from year to year; it drops low on chilly northern slopes and recedes to higher altitudes on a southern exposure; sends down long icy tongues in dark gorges, and leaves outlying patches of old snow in shaded spots or beneath a covering of rock waste far below the margin of the snow fields.

In the struggle for existence in the vegetable world, the tree line pushes as far up the mountain as conditions of climate and soil will permit. Then comes a season of fiercer storms, intenser cold and invading ice upon the peaks. Havoc is wrought, and the forest drops back across a zone of border warfare—for wars belong to borders—leaving behind it here and there a dwarfed pine or gnarled and twisted juniper which has survived the onslaught of the enemy. Now these are stragglers in the retreat, but are destined later in milder years to serve as outposts in the advance of the forest to recover its lost ground. Here we have a border scene which is typical in nature—the belt of unbroken forest growing thinner and more stunted towards its upper edge, succeeded by a zone of scattered trees, which may form a cluster perhaps in some sheltered gulch where soil has collected and north winds are excluded, and higher still the whitened skeleton of a tree to show how far the forest once invaded the domain of the waste.

The habitable area of the earth everywhere shows its boundaries to be peripheral zones of varying width, now occupied and now deserted, protruding or receding according to external conditions of climate and soil, and subject to seasonal change. The distribution of human life becomes sparser from the temperate regions towards the Arctic Circle, foreshadowing the unpeopled wastes of the ice-fields beyond. The outward movement from the tropics poleward halts where life conditions disappear, and there finds its boundary; but as life conditions advance or retreat with the seasons, so does that boundary. On the west coast of Greenland the Eskimo village of Etah, at about the seventy-eighth parallel, marks the northern limit of permanent or winter settlement; but in summer the Eskimo, in his kayak, follows the musk-ox and seal much farther north and there leaves his igloo to testify to the wide range of his poleward migration. Numerous relics of the Eskimo and their summer encampments have been found along Lady Franklin Bay in northern Grinnell Land (81° 50′ N. L.), but in the interior, on the outlet stream of Lake Hazen, explorers have discovered remains of habitations which had evidently, in previous ages, been perma-

nently occupied.* The Murman Coast of the Kola Peninsula has, in summer, a large population of Russian fishermen and forty or more fishing stations; but when the catch is over at the end of August, and the Arctic winter approaches, the stations are closed, and the three thousand fishermen return to their permanent homes on the shores of the White Sea.†

An altitude of about five thousand feet marks the limit of village life in the Alps; but during the three warmest months of the year, the summer pastures at eight thousand feet or more are alive with herds and their keepers. The boundary line of human life moves up the mountains in the wake of spring and later hurries down again before the advance of winter. The Himalayan and Karakorum ranges show whole villages of temporary occupation, like the summer trading town of Gartok at 15,000 feet on the caravan route from Leh to Lhassa, or Shahidula (3,285 meters or 10,925 feet) on the road between Leh and Yarkand;‡ but the boundary of permanent habitation lies several thousand feet below. Comparable to these are the big hotels that serve summer stage-coach travel over the Alps and Rockies, but which are deserted when the first snow closes the passes. Here a zone of altitude, as in the polar regions a zone of latitude, marks the limits of the habitable area.

Such boundaries mark the limits of that movement which is common to all animate things. Every living form spreads until it meets natural conditions in which it can no longer survive, or until it is checked by the opposing expansion of some competing form. If there is a change either in the life conditions or in the strength of the competing forms, the boundary shifts. In the propitious climate of the Genial Period, plants and animals lived nearer to the North Pole than at present; then they fell back before the advance of the ice sheet. The restless surface of the ocean denies to man a dwelling place; every century, however, the Dutch are pushing forward their northern boundary by reclamation of land from the sea; but repeatedly they have had to drop back for a time when the water has again overwhelmed their hand-made territory. The boundaries of race and state which are subject to greatest fluctuations are those determined by the resistance of other peoples. The westward sweep of the Slavs prior to the 8th century carried them beyond the Elbe; but as the Germans increased in numbers, outgrew their narrow ter-

* A. W. Greely, Report of the Lady Franklin Bay Expedition, Vol. 1, pp. 28–33, 236. Misc. Doc. No. 393. Washington, 1888.

† A. P. Engelhardt, A Russian Province of the North, pp. 123–130. Translated from the Russian, London, 1899.

‡ Col. Francis E. Younghusband, The Heart of a Continent, pp. 194–199. London, 1904.

ritories and inaugurated a counter-movement eastward, the Slavs began falling back to the Oder, to the Vistula, and finally to the Niemen. Though the Mohawk valley opened an easy avenue of expansion westward for the early colonists of New York, the advance of settlements up this valley for several decades went on at only a snail's pace, because of the compact body of Iroquois tribes holding this territory, while in the unoccupied land farther south between the Cumberland and Ohio rivers the frontier went forward with leaps and bounds, pushed on by the expanding power of the young Republic.

Anything which increases the expanding force of a people—the establishment of a more satisfactory government by which the national consciousness is developed, as in the American and French revolutions, the prosecution of a successful war by which popular energies are released from an old restraint, mere increase of population, or an impulse communicated by some hostile and irresistible force behind—all are registered in an advance of the boundary of the people in question and a corresponding retrusion of their neighbour's frontier.

The border district is the periphery of the growing or declining race or state. It runs the more irregularly, the greater are the variations in the external conditions as represented by climate, soil, barriers, and natural openings, according as these facilitate or obstruct advance. When it is contiguous with the border of another state or race, the two form a wide zone in which ascendency from one side or the other is being established. The boundary fluctuates, for equilibrium of the contending forces is established rarely and for only short periods. The more aggressive people throws out across this debatable zone, along the lines of least resistance or greatest attraction, long streamers of occupation; so that the frontier takes on the form of a fringe of settlement, whose interstices are occupied by a corresponding fringe of the displaced people. Such was its aspect in early colonial America, where population spread up every fertile river valley across a zone of Indian land; and such it is in northern Russia to-day, where long narrow Slav bands run out from the area of continuous Slav settlement across a wide belt of Mongoloid territory to the shores of the White Sea and Arctic Ocean.*

The border zone is further broadened by the formation of ethnic islands beyond the base line of continuous settlement, which then advances more or less rapidly, if expansion is unchecked, till it coalesces with these outposts, just as the forest line on the moun-

*Anatole Leroy-Beaulieu, The Empire of the Tzars, Vol. 1, Ethnographical Map. New York, 1893.

tains may reach, under advantageous conditions, its farthest outlying tree. Such ethnic peninsulas and islands we see in the early western frontiers of the United States from 1790 to 1840, when that frontier was daily moving westward.*

The breadth of the frontier zone is indicative of the activity of growth on the one side and the corresponding decline on the other, because extensive encroachment in the same degree disintegrates the territory of the neighbour at whose cost such encroachment is made. A straight, narrow race boundary, especially if it is nearly coincident with a political boundary, points to an equilibrium of forces which means, for the time being at least, a cessation of growth. Such boundaries are found in old, thickly populated countries, while the wide, ragged border zone belongs to new, and especially to colonial, peoples. In the oldest and most densely populated seats of the Germans, where they are found in the Rhine valley, the boundaries of race and empire are straight and simple; but the younger, eastern border, which for centuries has been steadily advancing at the cost of the unequally matched Slavs, has the ragged outline and sparse population of a true colonial frontier. Between two peoples who have had a long period of growth behind them, the oscillations of the boundary decrease in amplitude, as it were, and finally approach a state of rest. Each people tends to fill out its area evenly; every advance in civilization, every increase of population, increases the stability of their tenure, and hence the equilibrium of the pressure upon the boundary. Therefore, in such countries, racial, linguistic and cultural boundaries tend to become simpler and straighter.

The growth is more apparent, or, in other words, the border zone is widest and most irregular, where a superior people intrudes upon the territory of an inferior race. Such was the broad zone of thinly scattered farms and villages amidst a prevailing wilderness and hostile Indian tribes which, in 1810 and 1820, surrounded our trans-Allegheny area of continuous settlement in a one to two hundred mile wide girdle. Such has been the wide, mobile frontier of the Russian advance in Siberia and until recently in Manchuria, which aimed to include within a dotted line of widely separated railway guard stations, Cossack barracks, and penal colonies, the vast territory which later generations were fully to occupy. Similar, too, is the frontier of the Dutch and English settlements in South Africa, which has been pushed forward into the Kaffir country—a broad belt of scattered cattle ranches and isolated mining hives, dropped down amidst Kaffir hunting and grazing lands. Broader still was that shadowy

* Eleventh Census of the United States, Population, Part I, maps on pp. xviii–xxiii.

belt of American occupation which for four decades immediately succeeding the purchase of Louisiana stretched in the form of isolated fur-stations, lonely trappers' camps, and shifting traders' *rendezvous* from the Mississippi to the western slope of the Rockies and the northern watershed of the Missouri, where it met the corresponding nebulous outskirts of the far-away Canadian state on the St. Lawrence River.

The untouched resources of such new countries tempt to the widespread superficial exploitation, which finds its geographical expression in a broad, dilating frontier. Here the man-dust which is to form the future political planet is thinly disseminated, swept outward by a centrifugal force. Furthermore, the absence of natural barriers which might block this movement, the presence of open plains and river highways to facilitate it, and the predominance of harsh conditions of climate or soil rendering necessary a savage, extensive exploitation of the slender resources, often combine still further to widen the frontier zone. This was the case in French Canada and till recent decades in Siberia, where intense cold and abundant river highways stimulated the fur trade to the practical exclusion of all other activities, and substituted for the closely-grouped, sedentary farmers with their growing families the wide-ranging trader with his Indian or Tunguse wife and his half-breed offspring. Under harsh climatic conditions, the fur trade alone afforded those large profits which every infant colony must command in order to survive; and the fur trade meant a wide frontier zone of scattered posts amidst a prevailing wilderness. The French in particular, by the possession of the St. Lawrence and Mississippi Rivers, the greatest systems in America, were lured into the danger of excessive expansion, attenuated their ethnic element, and failed to raise the economic status of their wide border district, which could therefore offer only slight resistance to the spread of solid English settlement.* Yet more recently, the chief weakness of the Russians in Siberia and Manchuria—apart from the corruption of the national government—was the weakness of a too remote and too sparsely populated frontier, and of a people whose inner development had not kept pace with their rate of expansion.

Wasteful exploitation of a big territory is easier than the economical development of a small district. This is one line of least resistance which civilized man as well as savage instinctively follows, and which explains the tendency towards excessive expansion characteristic of all primitive and nascent peoples. For such peoples

*Fully treated in E. C. Semple, American History and Its Geographic Conditions, pp. 22–31. Boston, 1903.

natural barriers which set bounds to this expansion are of vastly greater importance than they are for mature or fully developed peoples. The reason is this: the boundary is only the expression of the outward movement or growth, which is nourished from the same stock of race energy as is the inner development. Either carried to an excess weakens or retards the other. If population begins to press upon the limits of subsistence, the acquisition of a new bit of territory obviates the necessity of applying more work and more intelligence to the old area, to make it yield subsistence for the growing number of mouths; the stimulus to adopt better economic methods is lost. Therefore, natural boundaries drawn by mountain, sea and desert, serving as barriers to the easy appropriation of new territory, have for such peoples a far deeper significance than the mere determination of their political frontiers by physical features, or the benefit of protection.

The land with the most effective geographical boundaries is a naturally defined region like Corea, Japan, Australia, Egypt, Italy, Spain, France or Great Britain—a land characterized not only by exclusion from without through its encircling barriers, but also by the inclusion within itself of a certain compact group of geographic conditions, to whose combined influences the inhabitants are subjected and from which they cannot readily escape. This aspect is far more important than the mere protection which such boundaries afford. They are not absolutely necessary for the development of a people, but they give it an early start, accelerate the process, and bring the people to an early maturity; they stimulate the exploitation of all the local geographic advantages and resources, the formation of a vivid tribal or national consciousness and purpose, and concentrate the national energies when the people is ready to overleap the old barriers. The early development of island and peninsula peoples and their attainment of a finished ethnic and political character are commonplaces of history. The stories of Egypt and Greece, of Great Britain and Japan, illustrate the stimulus to maturity which emanates from such confining boundaries. The wall of the Appalachians narrowed the westward horizon of the early English colonies in America, guarded them against the excessive expansion which was undermining the French dominion in the interior of the continent, set a most wholesome limit to their aims, and thereby intensified their utilization of the narrow land between mountains and sea. France, with its limits of growth indicated by the Mediterranean, Pyrenees, Atlantic, Channel, Vosges, Jura and Maritime Alps, found its period of adolescence shortened and, like Great Britain, early

reached its maturity. Nature itself set the goal of its territorial expansion, and by crystallizing the political ideal of the people, made that goal easier to reach, just as the dream of "United Italy" realized in 1870 had been prefigured in contours drawn by Alpine range and Mediterranean shore-line.

The area which a race or people occupies is the resultant of the expansive force within and the obstacles without, either physical or human. Insurmountable physical obstacles are met where all life conditions disappear, as on the borders of the habitable world where man is separated from the unpeopled wastes of polar ice fields and unsustaining oceans. The frozen rim of arctic lands, the coastline of the continents, the outermost arable strip on the confines of the desert, the barren or ice-capped ridge of high mountain range, are all such natural boundaries which set more or less absolute limits to the movement of peoples and the territorial growth of states. The sea is the only absolute boundary, because it alone blocks the continuous, unbroken expansion of a people. When the Saxons of the lower Elbe spread to the island of Britain, a band of unpeopled sea separated their new settlements from their native villages on the mainland. Even the most pronounced land barriers, like the Himalayas and Hindu Kush, have their passways and favoured spots for short summer habitation where the people from the opposite slopes meet and mingle for a season. Sandy wastes are hospitable at times. When the spring rains on the mountains of Abyssinia start a wave of moisture lapping over the edges of the Nubian desert, it is immediately followed by a tide of Arabs with their camels and herds, who make a wide zone of temporary occupation spread over the newly created grassland, but who retire in a few weeks before the desiccating heat of summer.*

Nevertheless, all natural features of the earth's surface which serve to check, retard or weaken the expansion of peoples, and therefore hold them apart, tend to become racial or political boundaries; and all present a zone-like character. The wide ice-fields of the Scandinavian Alps were an unpeopled waste long before the political boundary was drawn along it. "It has not in reality been a definite natural *line* that has divided Norway from her neighbour on the east; it has been a *band* of desert land, up to hundreds of miles in width. So utterly desolate and apart from the area of continuous habitation has this been, that the greater part of it, the district north of Trondhjem, was looked upon even as recently as the last century as a common district. Only nomadic Lapps wandered about in it,

* Sir S. W. Baker, The Nile Tributaries of Abyssinia, pp. 88, 128–129, 135. Hartford, 1868.

sometimes taxed by all three countries. A parcelling out of this desert common district was not made toward Russia until 1826. Towards Sweden it was made in 1751."*

Any geographical feature which, like this, presents a practically uninhabitable area, forms a scientific boundary, not only because it holds apart the two neighbouring peoples and thereby reduces the contact and friction which might be provocative of hostilities, but also because it lends protection against attack. This motive, as also the zone character of all boundaries, comes out conspicuously in the artificial border wastes surrounding primitive tribes and states in the lower status of civilization. The early German tribes depopulated their borders in a wide girdle, and in this wilderness permitted no neighbours to reside. The width of this zone indicated the valour and glory of the state, but was also valued as a means of protection against unexpected attack.† Similarly Xenophon found that the Armenian side of the river Kentrites, which formed the boundary between the Armenian plains and the highlands of Karduchia, was unpeopled and destitute of villages for a breadth of fifteen miles, from fear of the marauding Kurds.‡ In the eastern Sudan, especially in that wide territory along the Nile-Congo watershed occupied by the Zandeh, Junker found the frontier wilderness a regular institution owing to the exposure of the border districts in the perennial intertribal feuds.§ The vast and fertile region defined by the Ohio and Tennessee rivers, lay as a debatable border between the Algonquin Indians of the north and the Appalachians of the south. Both claimed it, both used it for hunting, but neither dared dwell therein.‖ Similarly the Cherokees had no definite understanding with their savage neighbours as to the limits of their respective territories. The effectiveness of their claim to any particular tract of country usually diminished with every increase of its distance from their villages. The consequence was that a considerable strip of territory between the settlements of two tribes, Cherokees and Creeks for instance, though claimed by both, was practically considered neutral ground and the common hunting ground of both.¶ The Creeks, whose most western villages from 1771 to 1798 were

* Norway, Official Publication for the Paris Exhibition, 1900, pp. 3–4 and map. Christiania, 1900.

† Cæsar, De Bello Gallico, Book IV, Chap. 3, and Book VI, Chap. 23.

‡ Grote, History of Greece, Vol. IX, Chap. 70, pp. 99, 115. New York, 1859.

§ Dr. Wilhelm Junker, Travels in Africa, pp. 18, 45, 79, 87, 115, 117, 138, 191, 192, 200, 308, 312 325, 332. Translated from the German. London, 1892.

‖ Theodore Roosevelt, The Winning of the West, Vol. 1, pp. 50, 70, 135. New York, 1895.

¶ C. C. Royce, The Cherokee Nation of Indians, p. 140. Fifth Annual Report of the Bureau of Ethnology. Washington, 1884.

located along the Coosa and upper Alabama rivers,* were separated by 300 miles of wilderness from the Chickasaws to the northwest, and by a 150-mile zone from the Choctaws. The most northern Choctaw towns, in turn, lay 160 miles to the south of the Chickasaw nation, whose compact settlements were located on the watershed between the western sources of the Tombigby and the head stream of the Yazoo.† The wide intervening zone of forest and canebrake was hunted upon by both nations.‡

Sometimes the border is preserved as a wilderness by formal agreement. A classic example in this case is found in the belt of untenanted land, fifty to ninety kilometers wide, which China and Korea once maintained as their boundary. No settler from either side was allowed to enter and all travel across the border had to use a single passway, where three times annually a market was held.§ On the Russo-Mongolian border south of Lake Baikal, the town of Kiakhta, which was established in 1688 as an entrepôt of trade between the two countries, is occupied in its northern half by Russian factories and in its southern by the Mongolian-Chinese quarters, while between the two is a neutral space devoted to commerce.‖

These border wastes do not always remain empty, however, even when their integrity is respected by the two neighbouring tribes whom they serve to divide; alien races often intrude into their unoccupied reaches. The boundary wilderness between the Sudanese states of Wadai and Dar Fur harbours several semi-independent villages whose insignificance is a guarantee of their safety from conquest. Similarly in the wide border district between the Creeks on the east and the Choctaws on the west were found typical small, detached tribes—the Chatots and Thomez of forty huts each on the Mobile River, the Tensas tribe with a hundred huts on the Tensas River, and the Mobilians near the confluence of the Tombigby and Alabama.¶ Along the desolate highland separating Norway and Sweden the nomadic Lapps, with their reindeer herds, have penetrated southward to 62° North Latitude, reinforcing the natural barrier by another barrier of alien race. From this point southward, the coniferous forests begin and continue the border waste in

* Albert J. Pickett, History of Alabama, pp. 79–89, 113–115. 1851. Reprint, Birmingham, 1900. James Adair, History of American Indians, p. 257. London, 1775.

† Ibid., pp. 282, 352–3.

‡ Albert J. Pickett, History of Alabama, pp. 133–135. 1851. Reprint, Birmingham, 1900.

§ Archibald Little, The Far East, p. 249. Oxford, 1905.

‖ M. Huc, Travels in Tartary, Thibet and China, 1844–1846, Vol. 1, p. 74. Translated from the French. Reprint. Chicago, 1898.

¶ Albert J. Pickett, History of Alabama, pp. 118–119. 1857. Reprint, Birmingham, 1900.

the form of a zone some sixty miles wide; this was unoccupied till about 1600, when into it slowly filtered an immigration of Finns, whose descendants to-day constitute an important part of the still thin population along the frontier to the heights back of Christiania. Only thirty miles from the coast does the border zone between Norway and Sweden, peopled chiefly by intruding foreign stocks, Lapps and Finns, contract and finally merge into the denser Scandinavian settlements.*

Where the border waste offers favourable conditions of life and the intruding race has reached a higher status of civilization, it multiplies in this unpeopled tract and soon spreads at the cost of its less advanced neighbours. The old No Man's Land between the Ohio and Tennessee was a line of least resistance for the expanding Colonies, who here poured in a tide of settlement between the northern and southern Indians, just as later other pioneers filtered into the vague border territory of weak tenure between the Choctaws and Creeks, and there on the Tombigby, Mobile and Tensas rivers, formed the nucleus of the State of Alabama.†

This untenanted hem of territory surrounding so many savage and barbarous peoples reflects their superficial and unsystematic utilization of their soil, by reason of which the importance of the land itself and the proportion of population to area are greatly reduced. It is a part of that uneconomic and extravagant use of the land, that appropriation of wide territories by small tribal groups, that characterizes the lower stages of civilization, as opposed to the exploitation of every square foot for the support of a teeming humanity, which marks the oldest and most advanced states. Each stage puts its own valuation upon the land according to the return from it which each expects to get. The low valuation is expressed in the border wilderness, by which a third or even a half of the whole area is wasted; and also in the readiness with which savages will often sell their best territory for a song.

For the same reason they leave their boundaries undefined; a mile nearer or farther, what does it matter? Moreover, their fitful or nomadic occupation of the land leads to oscillations of the frontiers with every attack from without and every variation of the tribal strength within. Their unstable states rarely last long enough in a given form or size to develop fixed boundaries; hence, the vagueness as to the extent of tribal domains among all savage peoples, and the conflicting land claims which are the abiding source of

* Norway, Official Publication for the Paris Exhibition, pp. 5, 83–84. Christiania, 1900.

† Albert J. Pickett, History of Alabama, pp. 416, 417, 461, 467. 1857. Reprint, Birmingham, 1900.

war. Owing to these overlapping boundaries—border districts claimed but not occupied—the American colonists met with difficulties in their purchase of land from the Indians, often paying twice for the same strip.

Even civilized peoples may adopt a waste boundary where the motive for protection is peculiarly strong, as in the half-mile neutral zone of lowland which ties the rock of Gibraltar to Spain. On a sparsely populated frontier, where the abundance of land reduces its value, they may throw the boundary into the form of a common district, as in the vast, disputed Oregon country, accepted provisionally as a district of joint occupancy between the United States and Canada from 1818 to 1846, or that wide highland border which Norway so long shared with Russia and Sweden. But such are only temporary phases in the evolution of a political frontier from wide, neutral border to the mathematically determined boundary line required by modern civilized states.

(*Conclusion in the* BULLETIN *for August.*)

GEOGRAPHIC INFLUENCE ON THE ECONOMIC HISTORY OF VIRGINIA.

BY

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The desire of gain, ambition for personal notoriety, and relief from religious or political oppression are the three important stimuli which have led to the discovery and occupancy of new territory. Each of these figured in the discovery and colonization of America. The commercial prompting predominated, since the great end to be achieved was the discovery of a shorter route to the South Sea, which would make the Indian trade more accessible. Whatever causes may have led to founding the Spanish settlements of the South, and later the Puritan settlements of New England, it is evident that the prospect of financial reward was the chief incentive which led to the settlement of that part of the American continent known as Virginia.

The expedition of Sir Humphrey Gilbert having proved a failure, Sir Walter Raleigh—his half brother—secured the patent renewed to himself, March 26th, 1584, and sailed April 27th from the west

coast of England with two small vessels. He sailed by way of the Canaries, and reached the coast of Florida July 4th, thence northward nine days to 34° N. Latitude, and landed on Roanoke Island* at the mouth of Albemarle Sound. He entered possession in the name and right of the Virgin Queen, and planted the first Virginia colony. They found on the island deer, rabbits, and fowls. The natives brought them melons, walnuts, cucumbers, peas and grapes, together with skins, corals and pearls, which they gladly exchanged for knives, hatchets, and toys. The report of the Indians as to the beauty and wealth of the inland country was so favourable that Raleigh returned to England about the middle of September (1584) to make representation to Queen Elizabeth. She promised whatever assistance might be necessary for promoting and perfecting the Roanoke settlement. A fleet of seven ships and one hundred and eight men was prepared, which set sail June 26th (1585) under command of Sir Richard Grenville. Ralph Lane was sent as Governor, and instructed to make extensive expeditions into the mainland. These were pushed eighty miles southward to the Indian village of *Secotan* (in the present County of Craven, North Carolina), and 130 miles northward to the Indian village *Chesapeake,* on the Elizabeth River (near the present site of Norfolk).

Raleigh arrived in midsummer and found food supplies so abundant that he provided inadequately for the next expedition, in consequence of which the colonists suffered greatly during the winter. This naturally discouraged them, and so great was their want that foul means were employed for securing food and skins from the Indians. Their enmity once aroused, they continued to harass the whites more and more. The following spring and summer failed to bring tidings or relief from England, all of which combined to make the condition more desperate. The promoters of the colony were utterly ignorant of the climatic conditions, and to this its failure is directly attributable. Sir Francis Drake, at the request of the Queen, visited the colony (August 1586) on his return from his successful expedition against the Spaniards† of the South, and so earnest were

* According to Hariot's Treatise and With's map (both men were members of the expedition) they landed first on an island called by the natives Wococon, a small island off the coast between Cape Hatteras and Cape Fear. After a short sojourn here they set sail up the River Occam and the next evening landed upon Roanoke Island at the mouth of Albemarle Sound. Stith's History of Virginia, p. 10.

† The Spanish colonization in the South was primarily for the purpose of obtaining gold, and this they hoarded. The antagonism between England and Spain grew out of the Reformation. Most of the wealth with which Philip II built the Invincible Armada came from his American Colonists. It is estimated that by 1609 more than $5,000,000,000 worth of gold and silver had been supplied. As Fiske aptly expresses it: "It was as the storehouse of the enemy's treasure and the chief source of his supplies that America first excited real interest among the English people."—JOHN FISKE, Old Virginia and Her Neighbors, Vol. 1, p. 9.

their entreaties that he took with him to England every surviving member. This for the time dampened the zeal for colonizing Virginia, but Drake's cargo of gold set the English merchantmen aflame with enthusiasm for finding the source of such fabulous wealth. History prepares the way. Raleigh fails to find its source in the South while on his Guiana expedition. The trade with the East Indies had been extended, and the revenues of the country increased. The war with Spain had revolutionized and enlarged commercial relations in general and the defeat of the Armada laid the bed-rock foundation for English colonization. The time was ripe for the exploitation of new schemes and enterprises. Accordingly, in 1604, the merchants of London, Bristol, Exeter, and Plymouth organized two companies, the "London" and "Plymouth," the business of the first to be the establishment of colonies in Virginia between 34°-38° N. Lat., and of the second the establishment of colonies between 41°-45° N. Lat. The fleet of the London Company, consisting of three vessels, sailed December 20, 1606, under the command of Captain Christopher Newport, and arrived at the mouth of Chesapeake Bay, April 26th. They landed on the Cape and built a fort, naming both after Prince Henry. This was only to be used as a camp while selecting a suitable place for the establishment of the colony. The experience of the previous expedition had thoroughly convinced them that the most important essential was the ease and perfection with which the place could be protected from the attacks of the Indians. At the mouth of the largest river which had been sighted from the bay they found an island of sufficient size, connected with the mainland by a small isthmus. On this they landed May 13th, 1607, and planted the first permanent English colony in Virginia, which they named Jamestown. On the 22d of June, Captain Newport sailed for England with a cargo of sassafras and fine wood for wainscoting, the first shipment of Virginia products. Edwin I. Wingfield was appointed president, but was deposed, and succeeded by John Ratcliffe. The location proved very unhealthy, and many died of malaria. At the end of the first year the supplies were exhausted, and the Indian raids, starvation, and disease had much reduced the disheartened ranks. Captain John Smith was the only man in the colony who could inspire the colonists to perseverance. He was equal to the task when present, but his great desire to find a river flowing into the South Sea kept him almost constantly on exploring expeditions. It is stated that he was at Jamestown but three days in three months during the summer of 1608. In September of this

year he visited the great Chief Powhatan at *Werowocomoco*, a village on the north bank of Pamaunke (York) River, for the purpose of delivering presents from the King. In the course of the interview he asked Powhatan about the country beyond the mountains, occupied by the powerful Monacans; and especially as to where *salt water* could be found in that direction. Powhatan declared with emphasis that there was no salt water beyond the mountains, and drew on the ground a map of that region. We may believe that it was very convincing to Captain Smith, as his further explorations were chiefly confined to the Chesapeake Bay and its shorter tributaries. Smith's map of Virginia was based upon personal observations and the information supplied by Powhatan. By means of pictures he depicted the game resources, which were to the early settlers one of the important economic resources. While Smith was exploring the Tidewater country most of the Colonists at Jamestown were engaged in gathering "gold dust," with which the return vessels were loaded; but on their arrival in England it proved to be "fool's gold," being nothing more than micaceous earth brought down by the streams from the crystalline rock area of Middle Virginia. The first Colonial attempts at manufacture are set forth in Smith's address to the Royal Council of Virginia sitting in London, which message was sent by Captain Newport in 1608: "In their absence [the boats] I followed the new begun works of pitch and tar, glass, soap ashes and clap-boards."*

In the same message we have a reflection of the character of the colonists of this period: "When you send again [workmen], I entreat you to send but 30 carpenters, husbandmen, gardiners, fishermen, blacksmiths, masons and diggers of trees' roots, well provided, rather than 1,000 of such as we have . . . . . These are the causes that have kept us in Virginia from laying such a foundation as ere this might have given much better content and satisfaction; but as yet you must not look for any profitable returns."†

The colonists found it difficult and dangerous to get an adequate meat supply from the forests, so Gates sent his admiral, George Summers, to the Bermudas in 1609 to capture hogs, which they had seen in abundance while shipwrecked on one of the islands. During the same year sheep, horses, goats, and poultry were introduced from Europe, and the following year cattle were brought from the West Indies. The extended use of meats made salt a much-needed article, and to meet this demand Sir Thomas Dale, deputy governor of the

* Smith's works, pp. 442–445. † Ibid.

colony, detailed a party in 1612 from the Jamestown settlement to go to the *Kingdom of Accawmacke* (Accomac) to manufacture salt by boiling salt water. This first white settlement on the Eastern Shore was named Dale's Gift, and, because of the island's separateness from the other colonies, the Kings of England for many years addressed all of their decrees to the *"faithful subjects in ye colonies of Virginia and ye Kingdom of Accawmacke."*. . It was in the same year that John Rolfe (who was married to Pocahontas in 1614) began the cultivation of tobacco. Dale always had a strong faith in the possibilities of the new country. In a letter home in 1610 he said: "Take the four best kingdoms of Europe, and put them all together, and they may no way compare with this country for commodity and goodness of soil." It was he who abolished the system of industrial communism which had been in vogue since the formation of the colony. Each colonist was now allowed three acres for cultivation, for which he was to pay a yearly rent of 6 bushels of corn. The economic effect was magical; as a result industry and thrift began to prevail among the lawless and thriftless.

Until 1616 lumber was the only export of the colonies, and this in small quantities, chiefly in the form of clap-boards. During the year Captain Yeardley began the extensive cultivation of tobacco* which was indigenous to the country, and generally used by the Indians. Yeardley's predecessor Dale had enacted a law requiring that the cultivation of corn should take precedence over tobacco; but Yeardley set this at defiance, and encouraged the tobacco industry, to the neglect of all others. So great was the demand in England that, in 1619, the King placed a duty of a shilling per pound on tobacco, when the market price was only five shillings. The charter, however, called for exemption beyond 5 per cent., and settlement was effected by a compromise, in which one of the considerations was that the cultivation be forbidden in the Kingdom. In 1621, a monopoly† of the tobacco trade was granted to certain individuals, at whose request a proclamation was issued, limiting the exportation to 55,000 pounds. The close of the year showed the market to be overstocked, and the King advised the colonists to turn their attention more to the cultivation of corn and the raising of stock. To this end the tobacco crop was limited to 100 pounds per man. The introduction of slavery in 1622 fostered the tobacco industry still more, to the almost entire suppression of all others. The situation was critical, and to meet it the Assembly enacted laws authorizing

* Indian name, *uppowoc*.

† This was the first tobacco trust organized in the history of the world.

the following bounties: 2 pounds of tobacco for every pound of flax or hemp ready for the spindle; 3 pounds for every yard of linen cloth a yard wide; 5 pounds for every yard of woollen cloth made in the province; and 10 pounds for every dozen pairs of woollen or worsted stockings. The legislature of 1623 ordered all settlers to plant mulberry trees; and in 1656 an act was passed imposing a fine on every planter who failed to have one mulberry tree to every 10 acres of land in his possession, but the labour surplus was inadequate for the silk industry even if all other conditions had been favourable. Prior to 1609 Smith had established three settlements: *Jamestown,* the seat of the colonial government; *Nansemond,* about 30 miles below Jamestown; and *Powhatan,* 6 miles below the James (Powhatan) River Falls. One hundred and twenty men were allotted to each, and the industrial operations radiated from these centres. We may feel sure that the early promoters were strongly imbued with the modern "boom" idea from the number of cities which were founded only in name—James City, Elizabeth City, Charles City, City of Henricus (Henricopolis). The agricultural development decreed the conquering of the wilderness, and the names of the imaginary cities survived as the names of counties, the City of Henricus* being changed to Henrico. A reference to the map will show that each of these counties had a water front on at least two sides. In fact, streams constitute the political boundaries of the counties of Tidewater Virginia to an extent not to be found in any other province in the world.

By 1624 the colony extended from the mouth of the James River to the James River Falls, with plantations on both sides, and covered most of the peninsula between the James and York Rivers (the latter known as Charles River until 1642). Almost every plantation could be directly reached by boat. Although Captain John Smith left Virginia in 1614 not to return, he predetermined the sections most favourably situated for successful occupancy by his methodic study and careful observations made during his frequent river expeditions. His economic deductions were largely based upon what he saw. The condition of the Indians gave the most reliable evidence as to the resources immediately available. He found the tribes of the Lower Potomac† and Rappahannock comfortable and surprisingly peaceable. The tribes were also far more numerous, being 34

* Henricus, founded in 1611, was located on Farrar's Island, as the peninsula was called (near Appomatox, Chesterfield County).

† The Indian name for the upper Potomac was Cohongoruton. It is so named in the Act of 1738, defining Frederick County. The south branch of the river was called Wappatomake. Lord Fairfax used the name Potomack and Wappatowmack, and Cohongoruton disappeared.

tribes north of the Rappahannock, and only 9 on the south side.* The superior oyster fisheries of the rivers and the neighbouring Chesapeake Bay waters made possible the friendly social relations by making easy the struggle for existence. Port Royal (Caroline County) was the terminus of the oyster beds. Fishing was not good above that point, and the stony land precluded cultivation with the wooden and stone implements, as a result of which we have no record of an Indian tribe residing permanently in the region. The tribes met with in the neighbourhood of Fredericksburg (Spottsylvania County) and Falmouth (Stafford County) were representatives of the implacable warriors of the stony interior region; which affords a striking proof of how much of the treachery and barbarity of primitive peoples is pressed upon them by the severity of the conflict for existence, in which only the strongest, shrewdest, and most daring can survive.

The Indians of the "Northern Neck" Country being friendly, their presence presented an additional inducement to English settlers, by reason of the profits to be realized from their trade. It was in this region that the next English settlements were founded.

If tobacco was "king" in the James River country, the oyster may be aptly designated as *queen* in the "Northern Neck."

In the establishment of an industrial system much depends upon the forces and conditions which give rise to the initiative. The acquirement of food and clothing constitutes the first essential. This obtained, the most profitable commodity, or means of exchange, is next to receive attention. The Virginia colonists had to meet the first by hunting, fishing, the cultivation of corn, raising of livestock, and bartering with the Indians. All of the conditions precluded a surplus of food stuffs, so that these are ruled out at this stage as possible commodities for exchange. But even if they had been possible, the demand would have been so limited as to make the production unprofitable. They must produce a surplus of that for which there is a pressing demand in England to realize profitable results. What were the leading English imports? Iron and steel from Spain; copper from Sweden; wine, salt and canvas from France; silks and velvets from Italy; spices from Asia; and naval supplies, such as tar, pitch, cordage, masts and yards, from Russia and Poland. The search of the colonists for gold and copper had been futile; in 1620, iron mines were opened at the James River Falls, but abandoned because inferior; the grape was neither adapted to the climate nor soil; great difficulty was experienced in supplying the

* Smith's Map of Virginia.

domestic demand for salt; the silk industry was then, and has ever been impracticable, because of non-adaptability of climate and lack of labour supply; and the great cost of transporting timbers made it impossible to compete with closer markets. Virginia's only hope, therefore, was to create a new demand, of which a surplus could be produced, for the purchase of the numerous supplies necessary to every country in the establishing stage. Fortune crowned the crisis in the introduction of tobacco. It is for this reason that tobacco has been called "king."

It seems timely here to inquire into the economic foundations of Virginia society, which has always been a type of Southern society, and why it so radically differed from that of New England. The social status of any differentiated society or community is fixed by the elemental habits and characteristics of the individuals comprising the group; and by the environment—the objective forces brought to bear on the subjective individual. Of these forces, the geographic conditions and the economic relations are by far the most important. Let us first inquire into the nature of the individuals. The early Virginia colonists were essentially of the English gentry on the one hand, and of the free and bond servant classes on the other, with a few who could lay claim to the nobility. This condition existed because the enterprise was primarily commercial, and, in consequence, appealed to the moneyed interests; which in turn required labour for carrying out its purposes. The promoters had neither political nor ecclesiastical grievance, and were not bound by the stress of poverty, so they adhered to their old habits, manners, tastes and styles of living, in so far as the new conditions permitted. The same strict adherence to the Church of England, and largely to the Crown, was also maintained for more than half a century. The plantation owners prospered, and increased in influence in the political arena to a position which they had found impossible in the mother country. The whole tendency was toward the establishment of large holdings. The extreme eastern coast was malarial, while further inland the climate was healthful, the soil fertile, and an abundance of game, which feature alone was very inviting to the English *gentleman*. England pushed slave labour into the colony as rapidly as it could be utilized. The dissolution of the Company in 1624 augmented the tendency to large estates, as its policy had been restraining in a measure, by making the landowners of two kinds—the planter, who held grants of land proportionate to his contribution of money and emigrants, and the small holder, who received an allotment as remuneration for working on the Company

land during a certain period. On the dissolution no change was made in the tenure, except that the free emigrant had to go out at his own expense, and bound in an agreement to bring the land under cultivation within a certain period or forfeit the right of ownership. Under this régime the yeomanry class did not progress, for the reason that they lacked administrative ability; and having grown accustomed to routine labour and dependence, became easily discouraged under the pressure of poverty, responsibility, and the stronger external hand of the landed aristocracy. Becoming poorer, they became free servants.

The increased prosperity of the planter prompted to a life of ease and independence. In most cases he was not even placed under the necessity of finding a market, or of concerning himself as to the ways and means of securing supplies, since foreign vessels loaded with a variety of merchandise came up to the plantation wharves to exchange their goods for tobacco. So satisfactory were the returns of soil tillage that the manufacturing enterprises were not prosecuted assiduously, except for those which could be done at home, by way of utilizing the surplus labour. The attitude of the representative planter is vouched for in the words of Thomas Jefferson: "Such is our attachment to agriculture, and such our preference for foreign manufactures that, be it wise or unwise, our people will certainly return to the raising of raw materials, and exchange them for finer manufactures than they are able to execute themselves. The political economists of Europe have established it as a principle that every state should endeavor to manufacture for itself, and this principle, like many others, we transfer to America without calculating the difference of circumstance which should produce a difference of result."*

I have not heard the opinion expressed, but I believe that slavery exerted a characteristic influence on Virginia society as marked as was its influence on the industrial system. It should be remembered that up to this time the great majority of those who had set the pace of a social system so individualistic as to stand out for generations as characteristic of the typical Virginian were slave owners and slave workers, and not slave traders. Most of the slaves of this larger class felt themselves not only a constituent part of the plantation, but an indispensable part; and so they were under the existing régime. This accorded to the servant a feeling of self-

* Jefferson's Notes on Virginia, p. 225 (1781). After the rupture with England, manufacturing was much more emphasized than before. The domestic wants were largely supplied by home manufactures, until the development of factory enterprises in New England, which were not extensive at the time Jefferson wrote his "Notes on Virginia."

importance, which found its counterpart in the personality of the master. The rich of every age are very much the same in being caterers to the recognition of the Court, the nobility, and the rich; and we may as truly add, to the humble, joyous—and in some cases worshipful—recognition of those who serve them. The latter existed in the person of the "old-fashioned darkey," as he can never be again. The plantation equipped with a full retinue of servants and slaves felt that it was a sufficiency unto itself, which, to an extent incalculable, fostered the clannish tendency toward seclusion, and intensified the ultra-individualism of the cavalier type.

Prior to 1688 Virginia adhered strictly to the Church of England, even to legislating against the Puritans, Quakers, and Separatists; and contested vigorously the position of the Presbyterians within her border. But while this ecclesiastical attitude had been maintained, and its power exercised, the idea of civil liberty was gaining strength in many parts. This had been brought about in part by oppressive taxation, and the indirect connection of the House of Burgesses with the Crown; but in an important sense through the influence of that prosperous, free, easy, isolated, independent life. As the civil attitude changed, the loyalty to the Established Church began to weaken. In 1696 a law was passed fixing the salary of every clergyman at 16,000 pounds of tobacco. The price so fluctuated that this made the salary quite variable. In some parishes only "Orinoco" could be raised, which was inferior to "sweet-scented." The books of that time bear frequent reference to a promotion from an "Orinoco parish" to a "sweet-scented parish." Where tobacco was not grown the Established Church was without representation, and it was "in the tobaccoless wilderness voices were heard of the Baptists, Quakers and less definable dissenters, who were directing the pioneer ax to the root of the established tree that protected the throne."*

The House of Burgesses passed an Act in 1755 enabling debtors to pay their tobacco obligations in money at the rate of 16s. 8d. per hundred pounds. The price of tobacco rose by reason of the drought, and many clergymen demanded payment in tobacco. A number of suits were instituted during the succeeding years, the final one being the appeal of Rev. John Camm to England in 1767. This case was heard before Colonel John Henry, the father of Patrick Henry. Patrick Henry had always been loyal to the Church and the Throne, but he grew so indignant over the controversies

* Barons of the Potomac and Rappahannock. It was seen in the Chapter on Population that the Scotch-Irish Presbyterians were the leaders in the movement.

that he flamed out in such an arraignment of the clergy as to break the authority of the Established Church, and thus became the darling of the Dissenters, the herald of the people's rights. As a result he was ardently supported when the Stamp Act agitation arose.*

* * * * * * * *

The mountainous portion of the State was destined to produce a different type of society. We have seen how distinctly different were the characteristics of the Indians of the western part of the State (Monacans) and the eastern tribes. During the first century of Colonial history no attempt was made toward settlements in the mountains. They were not adapted to the use of slave labour, were frequented by the most treacherous Indians, and so remote from market and void of transportation facilities as to be wholly impracticable for occupation.

The competition of slaves was very irritating to the free labourers of the East, and it was difficult to obtain small holdings, so dominant and domineering was the influence of the large owners. As a result, the bravest, strongest and most resolute of the free labourers forced their way westward and joined the Scotch-Irish Presbyterians†, who were coming in large numbers to the Valley as well as to the Piedmont frontier. These were the mountaineers of the eighteenth century, but must not be confused with that class known as "poor whites," either according to present or past acceptance of that term. It is true many of them were poor in possessions, but rich in valour, and came from the great middle class who had tired of landlord oppression in England, and slavery competition in eastern Virginia. The indolent, thriftless, lower class followed in their wake, but at a safe distance—far enough removed from the old settlements to eke out a bare existence by hunting and little work. On the mountains they remained in preference to subduing the great forests of the fertile intervening valleys, and there they are for the most part to be found to-day. In the middle of the eighteenth century the life of western Virginia compared with that of Tidewater as does the ranch life of the Rocky Mountains and the Plains with modern New England society life. From the first it was a life-and-death struggle, in which the weaklings were sure to go down. No man could stand alone, and so by ties of mutual sympathy and pro-

* The American Revolution really began with the resistance of the colonies to the irritating duties and regulations imposed by the Crown on the cultivation of tobacco.

It should also be remembered that a long contest in the reign of James I, which began with the discussion of the tobacco question, resulted in largely transferring the power from the Crown to the House of Commons.

† See Chapter on Population.

tection they were united in hearty, unselfish fellowship. As a class they were clannish, and more or less superstitious; loyal in their friendships and inexorable in their hates, but brave, just, generous, and industrious. It was these iron-nerved, steel-sinewed stalwarts who formed a line of mountain outposts between the older settlements of the coast and the treacherous Indian tribes of the west. Not only did they drive the savages beyond the mountains but followed them into the plains, and broke for all time the powerful confederacy. It was also these who, in that memorable battle of King's Mountain, turned the tide of the Revolution. They represent to-day a reserve force in the nation whose vitalizing lines are found to connect with all the throbbing centres of educational, commercial, and political activity.

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For the sake of comparison, let us question briefly why the social and industrial life of New England was so different from that of Virginia.

In 1614 Captain John Smith made a trading expedition to that territory, at which time he changed the name from *North Virginia* to *New England*. Although his sojourn was ostensibly for purposes of trade, on his return to England he left Captain Thomas Hunt in charge of one vessel, presumably to establish a footing, looking toward a permanent settlement; but Hunt enticed 27 Indians on board and sailed with them to Malaga, where he sold them to the Spanish at 20 pounds per head. This so enraged the Indians that they resented every effort toward colonization with great vigour and extreme ferocity. If there is anything which will put a people on their mettle "to do or die," it is an experience of exile for religious convictions; so the Puritans, many of whom had taken refuge in Holland before the intolerable attitude of Queen Elizabeth, were best prepared to drive the wedge. It was a congregation of Independents or Brownists, the strictest sect of the Puritans, that landed from the Mayflower December 11th, 1620, and others followed in rapid succession. The first colonists were as a rule poor, not having had the opportunity to accumulate, and the wealthier and more tractable Dissenters remained in England until the venture was tested. Those who came sought freedom above everything else, and expected to pay the price in unrelenting toil. The conditions placed upon them a strong community of interest, which had been growing since the foundation of Protestantism. They were thoughtful, sober, and economical. Being parties to a common cause and participants in a common lot, they became naturally characterized by

unanimity and equipoise. Life to them had been a severe drill in meeting the emergency, which developed the genius of invention, and prepared them in all respects for distinction along the lines which were pursued later so successfully.

The soil was not fertile and slave labour proved unprofitable. The South needed labourers and purchased them. English vessels were monopolizing southern traffic, so New England naturally decided to build ships and participate in the profits. As carriers, the opportunity of brokerage presented itself, and they shared in the profits of sale and distribution. New trading enterprises were contagious, and the business expanded with the traffic. The Revolution came, the conclusion of which ruled England out as neither a desirable competitor in transportation nor in the traffic of slaves and merchandise. New England stood ready to enter upon her new era of prosperity. It is true that the moral reaction against slave ownership had already become strong, but an earnest plea was made for the trade to tide her over the financial stress. This granted, her profits grew into a large surplus. Since the importation of slaves could continue no longer than 1808, the traders of New England were naturally on the lookout for investment opportunities, for the finding of which their extensive transportation and trade relations offered the best opportunity. They studied the methods by which England was growing rich. The manufacture of clothing constituted one of her most profitable industries, and Whitney's discovery of the cotton-gin, which revolutionized the production of cotton in the South, was New England's opportunity for the establishment of the American textile industry on even a more profitable basis than the English system. The manufacturing interests prospered, and the shipping interests suffered no loss, as the South became a large exporter of cotton. We conclude from this brief review that, just as the South from the very beginning of her history naturally developed along agricultural lines, so New England, finding herself at a disadvantage in the cultivation of the soil, naturally turned her attention to manufacture, trade and commerce.

THE VOYAGE OF THE *PLANET*.

The *Planet*, a steamer of 650 tons displacement, speed 9.5 geographical miles an hour, was built in 1905 by the German Government for oceanic researches and coast surveys. She sailed from Germany in January, 1906, for the German possessions in the Pacific, where she will be engaged for several years in survey and other work. Splendidly equipped in all respects, her voyage to the Bismarck Archipelago by way of Lisbon, Cape Verde Islands, St. Helena, Cape Town, Madagascar, Mauritius, Colombo, Macassar, and Amboina was made the occasion of a variety of scientific observations which have been reported in detail in the *Annalen der Hydrographie*. A summary of the work in all departments has also been contributed to *Globus*. (1906, p. 102 and 1907, p. 178) by Dr. Krämer, a member of the scientific staff.

The soundings throughout the voyage will make important corrections and additions to the charts. South of Cape Verde a depth of 2,805 fathoms was found where a bank with only 1,160 fathoms was supposed to exist. The contour of the ocean floor from deep-sea depths to Sierra Leone was determined. From Cape Town the route was deflected for some distance due south, with the result that the shoal reported by the *Cyclops* about the middle of the last century in 36° 40′ S., 41° 20′ E., could not be found, as depths reaching 2,952 fathoms occur at this place. Banks were discovered on the further voyage, one of them with only 750 fathoms being in 33° S., 36° E., and another with depths varying from 820 to 1,360 fathoms stretching south of Madagascar to 32° S. A line of soundings east from Madagascar shows a steep but regular slope. The *Planet* was unable to find the submarine reef reported by the *Valdivia* in 20° 10′ S., 68° E.

As the *Planet* approached the Malay Archipelago an important series of soundings was carried out to the west of the Sunda Islands, with results which will enable us to represent in future charts the sub-oceanic relief in this region with far greater accuracy than has hitherto been possible. The most important fact adduced was that a deep trough runs parallel with the south coast of Java and possibly also extends parallel with the Sumatra coast. This trough contains the deepest sounding yet obtained in the whole Indian Ocean (3,828 fathoms).

Prof. Supan prints a chart (*Petermanns Mitteilungen*, No.

3, 1907) which is based on this information obtained from the *Planet*. He calls attention to the fact that, several years ago, he suspected the existence of this trough and on the strength of two soundings indicated it in his bathymetric chart, which appeared in the *Mitteilungen* in 1899. The soundings of the *Planet* also demonstrated the double character of this line of depression, inasmuch as a second and shallower trough occurs nearer to the Java coast, a submarine ridge separating the two depressions. This ridge seems to be a southeasterly prolongation of that on which the Mentawy group off the coast of Sumatra stands; it is also separated from the larger land-mass to the east by a well-defined trough. Prof. Supan believes that this points to folding as a mode of origin of such troughs, another instance of which has recently been brought to light along the line of the Liukiu Islands.

Studies of coral formations were made in the Indian Ocean near Rodriguez and at Suadiva in the Maldives, and Dr. Krämer says in *Globus* that he found support there for the ideas of Voeltzkow concerning the part played by sedimentation in building up the reefs. He was also impressed with the luxuriance of the vegetation at Suadiva.

Soundings off the north coast of New Guinea showed that the sea-bottom falls to ocean depth even more steeply than on the east coast of Madagascar. At one place, only 9 sea miles from the land, a depth of 1854 fathoms was obtained. The Matty, Echiquier, Hermit, and Admiralty groups were found to rise from a plateau with depths of 500 to 800 fathoms, and the drop from these islands to the depths has at first an angle of about 45°.

Complete series of temperatures of sea water with samples from different depths were taken throughout the long voyage. The upper atmosphere was also assiduously explored by means of kites and balloons. In summarizing this feature of the work, the *Geographical Journal* (May, 1907) says that the balloon and kite ascents between Macassar, Celebes, and Matupi in the Bismarck Archipelago, at the time of the northeast monsoon, showed that the lower air current reaches an altitude of only about 1,300 to 1,600 feet, above which was a layer of still air of varying thickness, while above this an almost due east wind prevailed up to the greatest heights obtained, estimated at about 33,000 feet. In the Indian Ocean, the kites reached a height of about 16,000 feet, though, in the Atlantic, the limit, as a rule, was 6,500 feet. The results of these observations will afford interesting comparisons with those of Rotch, Hergesell, and others in the Atlantic.

MORE DETAILS OF AMUNDSEN'S ARCTIC WORK.

The paper which Captain Roald Amundsen read before the Royal Geographical Society on Feb. 11, 1907 (*Geog. Jour.*, May, 1907), contains interesting details of his work in the neighbourhood of the North Magnetic Pole. He decided to make his base station, where the instruments for magnetic variation were to be erected, at such a distance from the pole that the inclination would be about 89°. This requirement was fulfilled by Gjöahavn on the southeast side of King William Land, and this became his headquarters. He made many excursions to adjacent parts of the country and to Boothia Felix, where he succeeded, by the help of the declination of the compass, in absolutely proving, what of late has been assumed on theoretical grounds, that the magnetic pole has not an immovable and stationary situation, but in all probability is in continual movement. In what manner this movement takes place the considerable amount of material acquired by observation will, he says, when it has been worked out, give instructive information.

The magnetic observations were kept going day and night without interruption for 19 months. Prof. Mohn had equipped the expedition with a complete set of meteorological instruments, and observations in this branch of science were also taken the whole of the time.

Captain Creak, the British authority on terrestrial magnetism, in discussing Amundsen's paper said:

> From what Capt. Amundsen has described, I gather that he had a most splendid set of magnetic instruments. There were differential instruments which were going for 19 months, which tell us for every moment of the day what the direction of the needle was and the changes in the force directing it. Probably the declination of the needle was changing 10° either way—10° to the left and 10° to the right of magnetic north, and at about 7 o'clock in the morning and at 1 or 2 o'clock in the afternoon respectively. Still more important were the excursions he made, so that he could give a most valuable account of all the magnetic conditions surrounding him. He certainly, so far as I can see, found out where the pole was for one epoch, but there is still some doubt as to whether it is a fixed point or not. That remains to be proved. It will require years to get the observations into form, but I think we have every hope that eventually we shall be able to find out what magneticians have been wishing for, for many years. We shall have found out where the magnetic pole is, and also what is going on there.

Admiral Field, also commenting on the magnetic work, said he was sure that when the observations were thoroughly worked out they would be of the greatest service in improving our magnetic charts.

The most important geographical work, aside from the making of the Northwest Passage, was the sledge journey of Lieut. Hansen and Sergeant Ristvedt to chart the east coast of Victoria Land,

which had never been surveyed. They had two sledges, twelve dogs, and equipment for seventy days. They started on April 2, 1905. The depot which had been made a year before had been entirely spoiled by bears, but Lieut. Hansen and his companion shot bears, seals, and reindeer and thus spun the journey out for eighty-four days. Excellent work was done. The east coast of Victoria Land was charted up to the 72nd parallel. The land formerly seen by Dr. Rae at the south end of Victoria Strait proved to be a group of over 100 small, low islands. They were charted on the way back. An interesting event of this journey was the meeting with another unknown Eskimo tribe, the "Kiilnermium Eskimo," whose hunting fields extend from the Coppermine River eastwards. These Eskimo, like the others mentioned by Amundsen, have no connection with civilization.

GEOGRAPHICAL RECORD.

AFRICA.

HANS VISCHER'S JOURNEY ACROSS THE SAHARA.—This gentleman, formerly a missionary in northern Nigeria, has added another to the remarkable trips across the Sahara that have been made within the past two years. His route was from Tripoli to Lake Chad. He left Tripoli in July last year accompanied by a number of Mecca pilgrims from northern Nigeria. He brought ten of them with their families safely through the desert. In the mountains of Gharian he found people living in subterranean dwellings. He obtained considerable information regarding the Senussi. He says that this great sect is constantly losing ground owing to the fact that the late Mahdi died without accomplishing anything. The Senussists always teach the people to believe that it is they who will restore Islam to its old position. He found many Senussi clubs in parts of the desert along his route. Each club is a centre of religious observances and makes an annual contribution of dates, camels, etc., to headquarters. The Senussists tolerate but do not support the Turkish Government. Mr. Vischer expresses the opinion that the danger from the Senussi movement lies chiefly in the fact that there is at present no leader strong enough to control the various factions.

MR. AUGUSTE CHEVALIER IN THE IVORY COAST COLONY.—This well-known French explorer is now engaged in the study of the agricultural and forest productions of the French colony. *La Géographie* (No. 3, 1907) says that the new railroad enabled him easily to penetrate the depths of the great virgin forest of that region. The facility and safety with which he can move about and pursue his studies contrasts brightly with the difficulties which Binger, Hostains, and other explorers met there years ago. They had to overcome many obstacles, chiefly the hostility of the natives, and their attention was so distracted from scientific work that their reports on the flora, fauna, and ethnography of the country were necessarily very imperfect.

The country to-day is pacific, the colonial authorities have the natives under excellent control, and scientific work is carried on with every chance of success. Mr. Chevalier has found three species of mahogany all belonging to the order *Meliaceæ* to which the American mahoganies also belong. The finest of these mahoganies is known on the Congo, in the Kameroons, and in Nigeria, but is now first reported in French West Africa. The wood, he says, is of great beauty, and brings the highest price in the Liverpool market. In addition to mahogany he is finding other timber that may very profitably be exported.

Fruits in Cape Colony.—About three years ago New York began to receive fine fruits raised in parts of Cape Colony, which reach our market early in the spring, long before our own fruit trees blossom. This trade is expanding in New York and has reached large proportions in London. The fruit is sent in cold storage, and though, at first, much of it spoiled in transit, experience has demonstrated the practicability and great value of the trade. The *Agricultural Journal* of the Cape of Good Hope (April, 1907) has an article on the district of Stellenbosch, a great fruit and vine region, giving particular attention to the famous farm "Rustenberg," one of the great show fruit farms which make excellent profits on the fruit sent to the London market. The orchards contain many thousands of fruit trees, and the business is conducted on the principle that only the best varieties shall be produced and that of the best only the carefully selected shall be exported. Like most new industries, many failures were recorded at first, as the early efforts of fruit-growers were severely handicapped by lack of knowledge as to the varieties of fruit most suitable and acceptable in foreign markets. These problems have now been solved. Photographs of fruit-packing for export and other scenes are shown.

Rainfall of German Southwest Africa.—Important meteorological work is being carried on by the Germans in their possessions in Southwest Africa, as is evidenced by a discussion of the rainfall of that region, published in the "Wissenschaftliche Beihefte zum deutschen Kolonialblatte" (Band 20, Heft I. *Mitteilungen aus den deutschen Schutzgebieten. Die Niederschlagsverhältnisse von Deutsch-Südwestafrika.* Von Dr. F. von Danckelmann. Berlin, 1907). Dr. von Danckelmann has collected all available material from the territory with which he is concerned, and has added data from stations in adjacent parts of British and Portuguese possessions, for the sake of completeness. The means are reduced to the same period of time, and a series of charts presents the results very clearly. Along the coast it is practically rainless, the conditions being not unlike those along the desert west coast of South America. The prevailing winds along this African coast are southerly and southwesterly; and as they come off a cold ocean current, and are warming, they are dry, in spite of the fact that they are forced by the topography to climb over high land. The frequent coast fogs, like those along the arid west coast of South America, furnish some moisture to the land. The winter rains of the prevailing westerlies, found in the west of Cape Colony, do not reach north of the Orange River. The inland districts of German Southwest Africa have dry winters, with southwest winds, and a rainy season in summer, with easterly winds. Near Windhuk the mean annual rainfall is about 12 or 14 inches; in the far northeast it is over 25 inches. As this is a region of small precipitation, it is natural that the fluctuations in rainfall from year to year are great. At Windhuk the last twenty years have brought a year with 47 per cent. and a year with 210 per cent. of the annual mean. Heavy thunder-

storms and cloudbursts are the rule in summer. In 1900 the total rainfall at Udabis was 9.5 inches. On three consecutive days, 6.5 inches of this amount fell. It is obvious from this study of the rainfall that most of German Southwest Africa is not very favourably situated as regards human settlement.

R. DEC. W.

SECOND REPORT OF THE WELLCOME RESEARCH LABORATORIES AT KHARTUM.—This institution was founded to promote the scientific study of tropical disorders and technical education and to conduct investigations relating to water, foodstuffs, health, products, and other matters of practical interest in the development of the Sudan. The first report was issued in 1904. Since that time the record has been one of steady progress.

The second *Report* contains fourteen papers mostly of a technical nature, relating to human and animal pests and investigations concerning the products of the Sudan. The war upon the mosquito has been vigorously pushed in Khartum and in other parts of the Sudan. At Khartum, the *Anopheles* mosquito, believed to be the cause of malaria, has been practically destroyed. The tsetse fly and other noxious insects are being studied by agents of the laboratories throughout the Sudan, and special attention is now given to the matter of locust destruction—a very important question for farmers, as these insects have done great damage in some districts. Various diseases, affecting both human beings and domestic animals, are the subject of long reports. The publications of these laboratories are to-day among the most valuable results of scientific research relating to tropical conditions as affecting human and animal life and industries.

AMERICA.

PROGRESS OF SURVEYS IN ALASKA IN 1906.—The *Report* on the progress of investigations of Alaskan mineral resources in 1906 by Mr. Alfred H. Brooks and his assistants is published as *Bulletin* No. 314 of the U. S. Geological Survey. Fourteen parties were in the field from two and a half to six months. The aggregate areas covered by geologic reconnaissance surveys were 9,000 square miles; by detailed geologic surveys, 5,048 square miles; by topographic reconnaissance surveys, 200 square miles. The area of Alaska is 586,400 square miles. The *Report* shows that nearly 500,000 square miles have yet to be covered by geologic reconnaissance surveys. Until this work is much further advanced all generalizations on the distribution of the mineral wealth must remain largely hypothetical.

Preliminary topographic surveys, including about 50,000 square miles covered by the Coast and Geodetic Survey and other Government Bureaus, have been carried over less than a quarter of the entire area of Alaska. The importance of the rapid extension of these surveys is very great, for they are not only a guide to the prospector but are essential to all engineering enterprises. Thus far, nearly $500,000 have been spent on Alaskan surveys and investigations; but this is only about one-half of 1 per cent. of the value of the gold output during the same period.

A STUDY OF EVAPORATION AT SALTON SEA.—A conference committee from the U. S. Geological Survey, the Weather Bureau and the Reclamation Service has prepared a plan for the study of evaporation at Salton Sea (*Bull.*, 1906, p. 261) to be carried on under the direction of Prof. Frank Bigelow of the Weather Bureau and Dr. G. K. Gilbert of the Geological Survey.

Here is an inland sea, suddenly created in an old basin, in a warm climate, where evaporation is great, and without any important water supply in the future. The restoration of the Colorado River to its old channel has practically cut off influx to the sea. The water which remains can readily be measured and accounted for, and in order to determine the evaporation it will merely be necessary to observe the rate of recession of the lake and to take account of the attendant climatological phenomena.

The recommendations, in brief, are that the observations be continued over several years, and that they be undertaken as soon as possible after the summer floods of 1907, provided that the protective structures built to force the Colorado River into its normal channel withstand these floods, thereby indicating that the evaporation studies will not be interrupted by further extensive additions of Colorado River water. Supplementary studies of the character of the basin, inflow of surface waters and sub-surface waters and of engineering and geologic questions that may arise, will be carried on by the Geological Survey.

INVESTIGATION OF THE ATLANTIC AND COASTAL PLAIN.—Several State surveys, including North Carolina, Georgia, Alabama, and Mississippi, have arranged to co-operate with the U. S. Geological Survey in a detailed investigation of the stratigraphy and paleontology of the Atlantic and Gulf Coastal Plain. The aim is to determine the extent of the subdivisions recognized in New Jersey and Maryland on the north and Alabama on the south, to ascertain their relations to one another and to establish satisfactory correlations throughout the district between the Potomac and the Mississippi. Incidentally, economic studies, especially of phosphates, will be made. The State Geologists in the Coastal Plain districts and the chief geologist and chief hydrographer for the national Survey, with Dr. W. B. Clark as chairman, will supervise the work. Mr. M. L. Fuller, in charge of the field work, will put seven parties in the field this summer. It is hoped to complete the investigation in Virginia, North Carolina, South Carolina, and Florida during the next year, and to finish the work in the remaining States in 1908 and 1909.

REPORT ON MARYLAND COUNTIES.—Maryland is to be congratulated on the admirable series of practical and scientific reports in which the investigations of her Geological Survey are recorded. The latest publications of the Survey are two volumes on the physical features of Calvert County and St. Mary's County, respectively. They are the fourth and fifth volumes in a series of reports on the resources of the counties. Each volume treats the county with relation to the history of geographical and geological research—physiography, geology, economic resources, soils, climate, hydrography, magnetic declination, and forests. Indices make all the information easily available. Large-scale, topographical, geological, and agricultural soil maps accompany the volumes. The information contained in these reports cannot fail to prove of both economic and educational value to the residents of the counties as well as to all who desire detailed data concerning the State. The reports are illustrated with photographs.

SUMMER FIELD MEETING NEAR LAKE CHAMPLAIN.—Section E of the American Association for the Advancement of Science will hold a summer field meeting, July 3-10, in New York State, in the region between Lake Champlain and the Adirondacks. Dr. John M. Clarke has planned the meeting so that visiting geologists will see as much as possible of this extremely interesting region. He will give a paper on "Lake Champlain," including an account of the work of the

State in the Champlain valley, which is classic ground in the history of American geology. Plattsburg will be the headquarters of the meeting, which will be primarily for field excursions, though Dr. Lane, the retiring Vice-President, will deliver his presidential address, and a number of papers are expected.

THE CLIMATE OF KANSAS.—No. I, Vol. XXXV, 1907, of the *Monthly Weather Review* contains a stenographic report of the testimony given by Professor Willis L. Moore, Chief of the Weather Bureau, at a hearing before the Committee on Agriculture of the House of Representatives at Washington, D. C., January 8, 1907, together with a supplementary statement written by Professor Moore in order to counteract the impression created by erroneous newspaper reports of his testimony. The available records of rainfall in Kansas and Nebraska have been collected and examined. Taking thirty years of data, and dividing this period into three periods of ten years each, it is seen that the first and last ten years were periods of fairly abundant rainfall, and that the middle period was one of deficient rainfall. Furthermore, there is practically no difference between the precipitation of the first ten years and that of the last ten years. In 1906 heavy rains were common over a vast extent of territory west of the 95th meridian. The wind records show that the last fifteen years have not shown quite as much wind movement as the fifteen years previous, but it is obviously unsafe to assume that a permanent decrease in wind velocity is taking place. Professor Moore, in his testimony before the Committee, said regarding the present long period of abundant rainfall over the Plains, that he confidently looked for "as long a period of drought;" "that the time is now coming when we will have to go through a drought and a shortage of crops." R. DEC. W.

STATISTICAL ABSTRACT OF THE UNITED STATES FOR 1906.—This annual, issued by the Department of Commerce and Labor, increases in value with every new issue. The 29th volume is equalled by none of its predecessors in the variety of information covered. The facts relating to our area and population, finance, commerce, manufactures and mining, agriculture, prices of commodities, transportation, merchant marine, and other important topics that can have adequate expression in statistical form are given. The export and import relations of all the more important countries with the United States from 1865 to 1906 are detailed. The commercial movement of each of our seaports is given for the past seventeen years. Forty-one pages are devoted to one table recording the progress of the United States from 1800 to the present time and from a large number of points of view.

Fourteen pages are filled with the commercial and financial statistics of the principal countries of the world. We have no handbook relating to the material interests of the United States that is so helpful for daily reference as this one.

ARCHÆOLOGY AT PHILLIPS ACADEMY, ANDOVER.—This well-known academy is the only preparatory school in the world that possesses a fine museum and a Department of Archæology. It has recently issued *Bulletin* 3, giving a brief history of archæology at Phillips Academy and a narrative of explorations in various parts of our country. The volume contains many photographs showing specimens of early potteries and other objects, collectors at their work in the field, the fine building occupied by the Department, etc.

An article on "Mound Exploration," printed in the Philadelphia *Press* in 1895, led to correspondence between Mr. Robert S. Peabody of Germantown, Pa., an enthusiastic collector of archæological specimens and the writer of the article.

The result of this correspondence was that in 1901 Mr. Peabody and his wife founded the Department of Archæology at Phillips. The endowment was sufficient for future maintenance and for the erection of a beautiful building suitable for museum purposes and containing a large lecture-hall, a library, and offices. Mr. Peabody's entire collection, numbering some 38,000 specimens, is now in this building; and on Oct. 10, 1906, the specimens in the museum numbered 55,938. Thus far 114 students have taken the course in American archæology. The volume describes the field work done for Mr. Peabody and also the explorations conducted by the Department since 1901, and as yet unpublished.

The Climate of Yukon Territory.—Mr. R. F. Stupart, Director of the Meteorological Service of Canada, contributes to the *Monthly Weather Review* (Vol. XXXV, No. 1) a paper on *The Climate of Yukon Territory,* based on all available records. Meteorological observations were begun in November, 1895, and have been taken at Fort Constantine, Dawson, Selkirk, Tagish Lake, and White Horse. There is further available the record from Atlin, B. C., 25 miles south of the boundary, beginning with August, 1905. It appears that the northern and eastern portions of Yukon have warmer summers than the more southern portions, probably because the former are at a lower level; are farther from the westerly winds blowing from the Pacific, and are generally protected by mountains from 5,000 to 10,000 feet high. At Dawson the January mean temperature is about —24° Fahr. The absolute minimum is —68°. July has a mean of 60°.4, and the weather is quite comparable with that of the same month in southern Alberta. The longer days in the former locality probably give more rapid growth than in the latter. There are some few instances of a temperature record of 90°. The annual snowfall in the Yukon is about 52 inches, and the rainfall 7.5 inches. July, August, and September are the months of maximum precipitation, much of the rain coming in thunderstorms. There is little wind at Dawson in winter. Cyclones pass far to the southward, and the pressure gradients are usually weak. R. DeC. W.

Conditions of Navigation in Hudson Bay.—In Mr. A. P. Low's report on his expedition to Hudson Bay and the Arctic Islands in the *Neptune* in 1903-04 he summarizes the evidence concerning navigation in Hudson Strait and Hudson Bay. These waters do not freeze solid, but are so covered with floating ice as to be unnavigable for at least seven months in the year. The ice does not begin to melt until well into June, and is not sufficiently melted for safe navigation until the middle of July. The ice formed in the Strait and Bay is not sufficiently heavy to obstruct ordinary navigation until the latter part of November. The period of safe navigation for ordinary iron steamships to the port of Churchill may be taken to extend from July 20th to November 1. This period might be increased by a week in the beginning of the season, and by perhaps two weeks at the close.

The distance from Churchill, the proposed terminus on Hudson Bay of the railroad from the Canadian prairie wheat-fields, to Liverpool is almost the same as that from Montreal to Liverpool. Consequently there will be a saving in distance of 1,000 miles of rail or river carriage in favour of the northern route. Given a good harbour, such as that at Churchill, and an adequate number of steamships, there will be no difficulty in removing from that port during the season of safe navigation all the grain and other supplies that can be drawn there by a single line of rails.

CLIMATE OF NEW MEXICO.—There has thus far been little study of the climate of New Mexico. The "Report on the Climate of New Mexico, with particular Reference to Questions of Irrigation and Water Storage in the Arid Region," by Gen. A. W. Greely and Lieut. W. A. Glassford (Ex. Doc. No. 287. H. R., 51st Congress, 2d Session), published in 1891, is the only discussion of any considerable account. The Report of the Governor of New Mexico to the Secretary of the Interior for 1895 contained a few pages on the climate of the territory. And there have been a few scattering, shorter articles on the same subject. The most recent publication, "Forty Years of Southern New Mexico Climate," appears as *Bulletin* No. 59, New Mexico College of Agriculture and the Mechanic Arts, Agricultural Experiment Station. This was prepared by J. D. Tinsley, Soil Physicist and Meteorologist of the Experiment Station; embraces 43 octavo pages, and contains the meteorological observations made at the station from 1892 to 1905 inclusive, together with the temperature and rainfall records at other stations in the Mesilla Valley between 1851 and 1890, previously published in Gen. Greely's Report above referred to. The new data, for the Experiment Station, are the monthly and annual mean maximum, mean minimum and mean temperatures; highest and lowest temperatures during each month; number of days with temperature of 32 or less; number of days with temperature of 60 or less; precipitation; relative humidity, state of sky, and wind movement, for each month and year. These data have general application to those parts of southern New Mexico at altitudes of less than 4,000 feet.

The annual mean maximum at the Experiment Station is 76.8° in fourteen years. The annual mean minimum for thirteen years is 41.4° and the annual mean for forty years is 61.6°. The lowest temperature in fourteen years was 1° in December, 1895, and the highest, 106°, which has occurred several times. Temperatures of 10° and less are not uncommon at night in December, January, and February. The mean annual range of temperature is 35.4°. The absolute monthly range is from 45° to 75°. The greatest annual range was 101°, in 1895. The mean annual rainfall is 8.8 inches. The smallest was 3.5 inches in 1873, and the largest, 17.1 inches in 1905. The rainiest months are July, August, and September. Snow falls, but the amount is too small to be of economic importance. "The records," the *Bulletin* says, "scarcely sustain the idea that there has been a permanent increase in the rainfall." The annual mean of relative humidity is about 40 per cent. The average number of clear days a year is 225; partly cloudy, 91; and cloudy, 49. The evaporation is 5 to 6 feet a year.

R. DEC. W.

THE RAILROAD OVER THE PERUVIAN ANDES.—The *Consular Reports* say that six engineering parties this spring are selecting the route down the Atlantic slope of the Peruvian Andes for the railroad that is to connect the Amazon with the Pacific. Henry Meiggs built the western third of this railroad from Callao to Oroya, which is 220 miles by rail from the Pacific coast. Oroya is the starting-point of the line that is now to be built through the eastern ranges of the Andes and down the eastern slope. At last accounts, the survey on one of the six sections of the line had been completed, it was well advanced on the others, and building operations were to begin this year. The engineers say that a very large expenditure of labour and money will be required, but the entire route is now known to be feasible. The track will extend to the Ucayali, on whose navigable waters passengers and freight will pass to and from the ocean vessels that ascend the Amazon, 2,000 miles, to the river port of Iquitos. It is expected that this

enterprise will give an impetus to the development of the eastern territories of Peru known as the Montaña and embracing about 500,000 square miles.

ASIA.

THE STUDY OF HIMALAYAN GLACIERS.—The Commission Internationale des Glaciers in 1905 called the attention of the Geological Survey of India to the importance of recording data for determining the secular movements of the principal Himalayan glaciers. Five officers of the Survey were therefore deputed during August and September last year to make a preliminary survey of the principal glaciers in the Kumaon, Lahaul, and Kashmir regions. Twelve glaciers were examined, and photographs were taken showing the state of the glaciers and of the principal masses of moraine material at the time of the visit. These photographs will enable travellers to form an idea of any changes that may occur in the interval, and thus make the observations of value, even if the fixed points cut in the rocks are obliterated. Reports of the work with plane-table sketches and photographs will be published for the use of travellers in the three regions. It was found that the glaciers of the Hunza valley and the Karakoram range generally descend to lower altitudes than in the Lahaul and Kumaon regions. In the former region the foot of the glaciers descends to levels of 7,000 or 8,000 feet, while in the latter region it melts before descending below 11,000 feet. There was prominent evidence of general retreat shown by old moraines (sometimes grass-covered) at lower levels in the valleys. This, of course, does not necessarily mean that the glaciers are now in retreat, and two cases of recent advance were found in the Yengutsa and Hassanabad glaciers.—(*Records of the Geol. Survey of India, Vol. XXXV, Part I.*)

CLIMATE OF BUITENZORG, JAVA.—The *Meteorologische Zeitschrift* for March, 1907, reprints some interesting extracts from a book of Haberlandt entitled "Eine botanische Tropenreise" (Leipzig, 1903), in which various climatic characteristics of Buitenzorg are clearly brought out. The daily thunderstorms are accompanied by continuous thunder and lightning, and some of the trees in the famous Botanical Gardens of Buitenzorg are struck every year. The lightning strokes hardly ever set fires; houses are never injured, and are not provided with lightning rods; the strokes rarely do mechanical damage. Trees struck by lightning show no splintering or tearing; after a few days the leaves gradually change colour and the tree dies.

The lowest temperature varies between 70° and 73.5°. The bright, fresh, sunny morning is wonderfully attractive in the early hours. During the morning the temperature rises to between 84° and 88°, the maximum coming between 1 and 2 P. M. About noon come the first cool gusts of wind. During the afternoon the temperature falls with increasing cloudiness and rainfall to 73.5°-77°. Then Europeans change their clothing. The light tropical attire of morning, which is kept on during the early afternon hours, while every one indulges in a siesta and the thunderstorm is in progress, is replaced by a light woollen suit, of dark colour, and in this the evening stroll or drive is taken. On these drives a light overcoat is not superfluous. After sunset the temperature falls slowly to the minimum. At dawn, while half asleep, one frequently feels chilly, and pulls up the bedcovering more closely. When these same temperatures are experienced in sleeping-rooms in Europe, people find it difficult to secure a night's rest because of the heat. The body soon adjusts itself to the continuous high temperatures and high

relative humidity of the tropics, and becomes very sensitive to slight temperature changes. This is true of natives as well as Europeans. Professor Haberlandt did not find that the high temperatures made him feel the need of the cooling incident to taking a cold bath. The Dutch in Java fear the excessive loss of body-heat which a cold bath produces, and believe that the chill which follows too long a time spent in a cold bath is apt to be followed by fever. The author found no discomfort as regards the temperature when, after several months' stay in Buitenzorg, he went to live at a higher altitude, where the temperature at sunrise was only 57°-59°. Dutch residents who have been in Java for several years do not hesitate to go back to Holland in winter. The daily thunderstorms, so well described by many previous travellers, and especially by Junghuhn, attract the attention of Professor Haberlandt, who gives a vivid account of the tremendous downpours of rain; the rapid swelling of the streams, and the grandeur of the clouds and lightning.

The sky in Java is not of the deep blue which most people associate with the tropics, but is pale, on account of the large amount of water vapour in the air, often condensed into light clouds or fogs. The light of the sky is very strong, and vegetation is markedly controlled by it. "On the verandas the lamps are lighted between 6 and 7 P. M., and then you enjoy with a calm satisfaction the wonderful tropical evening, which combines the charm of a mild summer night with the comfort of a long winter evening." R. DEC. W.

ARCHÆOLOGY IN CHINESE TURKESTAN.—According to the London *Times* for May 31, letters dated Lop-Nor, February 18, have been received from Dr. M. A. Stein concerning the progress of his archæological investigations in the Lop or Tarim basin of Chinese Turkestan. Since last October he has pushed eastward from Keriya to Lop-Nor along the narrow zone of vegetation which encircles the deserts of Takla-makan and Lop. The zone, in this part of its course, lies at the foot of the Kwen Lun Mountains, the great range on the northern border of Tibet, whence flow the few streams which alone make human habitation possible in the desert basin of Lop. In the zone of vegetation, or in the desert a little north of the zone, Stein has carried on excavations at four chief sites during the past winter. The most western of the sites described in the present letters is located far out in the sandy desert sixty miles north of the modern oasis of Niya in the zone of vegetation. Stein there cleared nearly thirty dwellings in addition to those which he investigated in 1901. Large numbers of wooden tablets were found inscribed in the Kharosthi script peculiar to the extreme northwest of India not far from the beginning of our era, and introduced thence, apparently, into Chinese Turkestan. Sanskrit documents were also obtained, together with Græco-Roman intaglios and Chinese seals, showing that influences from far to the south, the west, and the east had penetrated to the very centre of Asia seventeen centuries or more ago.

Farther east at Endereh (Tuholo) Dr. Stein's work brought to light a still further collection of Kharosthi records on wood, which clearly belong to the close of the third century of our era or thereabouts. At the time of his earlier visit he discovered epigraphical records in the Tibetan language dating from about the beginning of the eighth century. It thus appears that four or five centuries after its abandonment in the third century the site was reoccupied, only, as it seems, to be abandoned again during the Tibetan invasion which followed not long after. At Cherchen, still farther east, there appears to have been a similar abandonment

of an ancient town during the sixth century, followed by reoccupation a century or two later. The town was inhabited at the time of Marco Polo, about 1300 A. D., but was abandoned later, and again revived about 1830 or 1840. About two hundred miles east of Cherchen lies Miran, close to the famous lake or swamp of Lop-Nor, and not far from the eastern end of the zone of vegetation. It was an important site in former times, as it guarded not only the road from Turkestan to Tibet, but also the far more important trade-route from the West to China. Its ruins are remarkable for the large number of religious structures. Stein's excavations brought to light Kharosthi documents on wood and numerous paintings and stucco reliefs showing the influence of Indian art on the one hand and of Græco-Roman art on the other. The inscriptions prove that the town was occupied by the race which peopled Niya and other parts of the Lop basin far to the west. Like most of the ruins of Chinese Turkestan, it was abandoned in the third century of the Christian era. A complete clearing of the large ruined fort brought to light nearly a thousand Tibetan records, which show that, after remaining deserted for four or five centuries, the town was reoccupied in the same fashion and at the same time as Cherchen and Endereh.

Nearly a hundred miles north of Miran the ruins of Lulan cover a broad area on the north side of the salt plain which once formed the bed of the expanded Lop-Nor of ancient times. The earliest human relics in this region consist of flints and crude pottery dating from an unknown but very early period. Here, as at all the other sites, Stein found Kharosthi documents fixing the date of the abandonment of the main ruins at about the end of the third century. The style of the architecture and of the carvings upon wood, the form of the shrines, and the nature of the objects of ordinary household use proved to be the same as in the ruins from 500 to 800 miles away on the south side of the Lop basin. Chinese influence was evidently stronger here than there, but the main mass of the people belonged to the same race.

Dr. Stein's investigations, together with those of LeCoq, described in a recent number of the BULLETIN, have greatly increased our knowledge of the archæology and history of Central Asia. It appears that at the beginning of our era the Lop basin and the neighbouring regions, such as Turfan, were much more densely populated than at present. The manner of life of the people appears to have been almost identical with that of to-day, although, on the whole, the state of civilization was higher. Then, as now, many of the houses were built of reeds, poplars, and tamarisks woven or tied most skilfully without the use of nails. Many places where agriculture was then possible are to-day either absolutely uninhabitable or are capable of sustaining no human population except wandering shepherds. A great change evidently came over the country during the first two or three hundred years of the Christian era, causing the abandonment of many towns which had previously boasted of a high degree of prosperity. After a few centuries of desertion, a number of these places were reoccupied, but never attained any great degree of prosperity or any great density of population. It is noteworthy that changes of the same sort took place at this time not only in Chinese Turkestan, but in other parts of Asia thousands of miles away. This fact, joined with the apparent impossibility of restoring the ancient prosperity by reason of the present lack of water, has led some observers to the conclusion that the abandonment and reoccupation of the ruins and the accompanying wars and invasions were due largely to changes of climate. The conclusions of Dr. Stein upon this subject may be expected to prove of great interest. E. H.

AUSTRALIA.

GEOLOGICAL SURVEYS IN WESTERN AUSTRALIA.—The Geological Survey of Western Australia is making, under the direction of Mr. A. Gibb Maitland, Government Geologist, a series of special reports on the different mining fields of the State. The latest gives the results of Mr. C. G. Gibson's investigation of the Mount Margaret gold field, published as *Bulletin* 24. This district was formerly included in the North Coolgardie Field, from which it was separated in 1897. It embraces an area of 42,252 square miles. The first mention of this district is found in the journal of Sir John Forrest when he was searching for the remains of Dr. Leichhardt in 1869. He discovered and named Mount Margaret, but saw nothing that suggested the presence of gold which has since made this district one of the most important mining regions of Western Australia. The report is accompanied by a series of geological and mining plans and maps.

EUROPE.

THE MONT BLANC RAILROAD.—The Geneva correspondent of a London newspaper writes that French engineers have already constructed the permanent way of the Mont Blanc railway as far as Mont Lachat, 7,000 feet above the sea, or nearly half way to the top, and as soon as the rolling stock is ready the first section of the line will be opened. The other stations are: Rognes, 8,135 feet; Tête Rousse, 10,550 feet; Aiguille du Goûter, 12,000 feet; and Dome du Goûter, 13,473 feet. Up to 8,220 feet, the roadway will be in the open, commanding magnificent views. From this altitude to 11,900 feet, the trains will pass through a gallery bored in the mountain side and having frequent openings in the rock. From 11,900 feet to the summit, a tunnel will be driven under the glaciers so as to protect the line from avalanches. This part of the line will take many years to construct; but meanwhile a path will be laid from the summit of the Aiguille du Goûter, so that tourists may reach the top by sledge without danger or fatigue.

LOCAL CLIMATOLOGY OF THE SWISS VALAIS.—An instructive paper on "The Swiss Valais: A Study in Regional Geography," by Marion I. Newbegin (*Scot. Geogr. Mag.*, April, 1907), emphasizes several noteworthy points in the local climatology of the Canton Valais. The rainfall is not directly dependent on altitude, but is controlled by the general trend of the valley of the Rhone. Up as far as Martigny the valley is exposed to cold, rainy northwest and west winds; while above the bend at Martigny these wind directions are rare, being replaced by warmer and drier southwest winds, which enter the valley from a higher altitude, and therefore have somewhat of a foehn character. The distribution of the beech trees is closely controlled by the rainfall, these trees extending up the Rhone valley as far as the westerly winds from the Lake of Geneva penetrate —*i. e.*, throughout the area where the damper climate prevails. The effect of the winter invasions of temperature, characteristic of all mountain regions, is especially striking. The flat valley floor is on this account unsuitable for human habitations, and there is a general tendency for houses to be located along the sides of the valley rather than on the floor. The frequency of autumnal inversions makes it possible for the inhabitants to ascend to considerable elevations and yet enjoy comparatively mild temperatures. The direction of the upper part of the valley, which allows the sun to shine for a much longer period than would be possible in an east-and-west valley, is an important factor in producing unusual conditions of warmth there. The portion of the valley below Martigny is subject

to frequent and often violent winds. The large percentage of calms makes it possible to use places of relatively great elevation as health resorts, but it also makes it impossible for foreigners to live with comfort on the floor of the Rhone in summer.

The high temperatures over much of the Canton lead to the growth of plants of Mediterranean character. The small rainfall limits the growth of deciduous trees. The steppe-like conditions produced by the strong insolation and low precipitation are counteracted by a system of irrigation depending on the melting of ice and snow. R. DEC. W.

THIRD CENTENARY OF BENTO DE GOES.—The Lisbon Geographical Society celebrated on April 11 the third centenary of the death of Bento de Goes, the illustrious Portuguese traveller of the seventeenth century. The journey that perpetuated his name extended from Goa, the Portuguese port in West India, northward between the Western Ghats and the Indian Ocean through the Punjab, Cabul and the Pamir, thence eastward through eastern Turkestan, to Turfan and Suchow, south of the Gobi waste. The countries and peoples he visited were largely unknown, and his observations threw a great deal of light upon them. The *Boletim* of the Lisbon Society is printing the history of his travels; and the Society issued a special pamphlet on the occasion of the explorer's anniversary, containing a sketch of his life and work by Augusto Ribeiro and an account of his itinerary and maps by Ernesto de Vasconcellos.

OCEANOGRAPHY.

THE PHILIPPINES TROUGH.—The German survey vessel *Planet*, in her recent voyage from Matupi to Manila by way of Nusa, Yap, and the Palau Islands (Jan. 5-Feb. 8, 1907), made 36 soundings in the waters just east of the Philippines, from the southern part of Mindanao to Luzon, north of the latitude of Manila. Here was found a deep trough, like those along the Aleutian and Japanese Islands. The existence of this trough was established by soundings in four cross sections. It is from 8,000 to 9,000 meters in depth, and extends along the east coast from Mindanao to San Bernardino Strait, which separates Samar from Luzon. Its distance from the coast is 25 to 45 nautical miles. The greatest ascertained depth of the Philippines Trough (Philippinengraben) was in the southern part, where a depth of 8,554 meters was attained without reaching bottom, and in the north about 8,900 meters, where bottom was reached with only 63 meters of the line remaining on the ship. The slope from the coast is very steep, the angle of slope in the north being eleven degrees (8,900 meters in twenty-five sea miles). These facts and a chart of the survey are given in the *Annalen der Hydrographie* No. 5, 1907.

POLAR.

THE BELGIAN SOUTH POLAR EXPEDITION.—The preparations for the new Belgian Antarctic expedition, which is to be headed by Dr. H. Arctowski, are said to be making excellent progress. It is estimated that the entire cost of the enterprise will be 800,000 francs, of which a wealthy patron in Brussels has contributed 200,000 and the city of Antwerp 250,000 francs. Dr. Arctowski does not expect to start until 1909, and his scientific programme in the Antarctic will occupy him two years. The *Geographischer Anzeiger* says that one of his chief purposes will be, if possible, to ascertain whether there is a land connection between Graham Land and King Edward VII Land.

PRINCE CHARLES FORELAND, SPITZBERGEN.—Dr. William S. Bruce, according to the *Scottish Geographical Magazine*, has sailed to the polar regions for the eighth time. He is making a second expedition to Prince Charles Foreland, Spitzbergen, to complete his topographical survey of the island and his study of its geology, fauna, and flora. He hopes to extend the hydrographical survey in Foreland Sound, and, if possible, to fix the edge of the continental shelf. A special steamer was chartered for the expedition, and it is supposed that the party landed on Prince Charles Foreland about June 8. The steamer will not await the completion of the work; the expedition will be taken back to Europe by the Prince of Monaco on board his yacht, the *Princesse Alice*.

GILLIS LAND.—A German named Cerner is reported in the public press as expecting to lead an expedition to northeast Spitzbergen to locate Gillis Land. It is the general opinion, however, that this question was settled by Dr. Nathorst in his Arctic expedition of 1898. Few regions in the far north have ever been the subject of so much misunderstanding as Gillis Land.

Captain Cornelis Gilies, a Dutch sailor, found an island to the east of N. E. Spitzbergen in 1707. He said it was about 100 miles (25 Dutch miles) east of Spitzbergen. In his day, longitudes were often miscalculated, and it is believed that the island he saw is now more than fifty miles from the archipelago.

His name was given to the island, but is commonly printed Gillis Land. It has also two other names, bestowed by two of the three men who have seen the island since Gilies introduced it to notice. In 1863 Captain Carlsen, and in 1864 Captain Tobiesen, declared that they saw Gillis Land; but it was found later that what they saw was King Charles Land, farther south. Others who reported that they had visited Gillis Land were shown instead to have called at Wiche Island. Petermann helped to intensify the confusion by disparaging Van Keulen's chart on which Gillis Land first appeared and placing the island on his maps ninety miles further north, on the authority of Mr. Barrington. Sir Clements Markham found, years later, that Barrington really agreed with the old Dutch chart, but the change suggested by Dr. Petermann appeared for years on German Arctic charts. The Germans recently have replaced the island on their maps in its old position.

When Jackson spent three years in Franz Josef Land, he sought for Gillis Land to the west; but, misled by the erroneous longitude of its discoverer, he came home declaring that the island did not exist in its assigned position.

Gillis Land was rediscovered by Captain Kjeldsen in 1876. He found it in 80° 10′ N., the latitude of Van Keulen's chart, and about 32° E. It was wrapped in snow and ice, and he named it White Island. It was seen again in 1883 by Captain Johannesen, who named it New Iceland and fixed the position of its southwestern point in 80° 10′ N. and 32° 3′ E.

Dr. Nathorst, who circumnavigated the island in 1898, made a landing on it and described it as a land-mass of remarkable beauty, rising in regular curves to a height of about 700 feet and perfectly white with snow from the summit to the sea edge. The island figures on the latest Stieler chart as "White Island (Gillis Land)."

VARIOUS.

ABRASION BY GLACIERS, RIVERS, AND WAVES.—Under the above title Lewis G. Westgate discusses the details in form of those surfaces which have been subjected to erosion by glaciers, rivers, and waves, and presents certain conclusions re-

garding the manner in which the erosion is effected (*Journal of Geology*, XV, 1907, 113-120). Corrasion, including all mechanical wear by streams, glaciers, or waves, is subdivided into the two processes "abrasion" and "plucking," the former meaning the mechanical wear effected by tools, the latter the removal of rock fragments. The author then shows that those surfaces over which glaciers have moved are not uniformly smooth or sub-even, but more often "hackly" and showing good evidence of joint control in the details of form. An examination of stream beds often shows the same character, although cases are noted where the channel is quite smooth. The same effect of joint control was likewise noted at the only point where the author made a study of wave action. On the basis of these observations it is concluded that abrasion, or the wear effected by the transported material (tools) of glaciers, rivers, and waves is an unimportant factor, since abrasion should leave a smooth or sub-even surface. Plucking, or the removal of rock fragments, the only other factor in corrasion, is then shown to be of doubtful effectiveness; whence it is concluded that streams, and to a certain extent glaciers and waves, are transporting and not corrading agents. Weathering becomes the important factor, the transporting agent mainly serving to remove the materials, and so prevent clogging.

There are several reasons why Professor Westgate's analysis does not appear convincing. One cannot feel sure that abrasion must produce a smooth surface, and hence that rough surfaces cannot be to any considerable extent the results of abrasion. On the contrary, there is good reason to believe that, under certain conditions, an abrasion surface will necessarily be rough. A piece of fine sandpaper drawn across a table top will produce a smooth surface in course of time. A hob-nailed boot drawn across the table, under the weight of a heavy man, will produce a rough surface. The character of the abrading agent may affect the case. A heavy weight dragged across a wooden floor would leave the floor uninjured; but the same weight dragged across a tiled hearth might force some of the tiles from their places. The character of the surface abraded is an important factor to be considered. It is quite conceivable that a great glacier, armed with fragmentary débris frozen in its base, and grinding over a surface of jointed rock, might tear joint block after joint block from its place, the planes of fracture being quite often the planes of weakness due to joint structure. This is certainly abrasion; and yet the residual surface would not be smooth, but hackly and the details joint-controlled.

The ineffectiveness of waves which attack a vertical cliff descending abruptly into deep water, under conditions which give the waves no tools to work with, has often been noted. On the contrary, waves armed with boulders actively undermine cliffs of hard rock, producing the characteristic notch often seen at the base of such cliffs. Contrary to the author's belief that the bombardment of a cliff during a heavy storm would not seriously affect it, the pronounced effect of storm waves upon natural cliffs and walls of masonry is well known to those who live along the sea. Such a bombardment breaks off fragments of rock from the base of the cliff, and the breaking is most apt to take place along joint planes. Abrasion is the effective agent; yet the resulting surface is rough and joint-controlled. In the same manner it may be doubted whether we are wrong in believing that a stream laden with some sediment is a much more effective erosive agent than a stream which has no tools to work with. Those who have listened to a mountain torrent during a flood, rolling heavy boulders along its rocky channel with dull, booming concussions, will expect such abrasion by a young stream to do effective

work, yet leave a rough surface. The decreasing effect of abrasion during maturity and old age is well known and streams in these stages of development should not be selected for study in the problem here considered. D. W. J.

CHANGES IN SEA-LEVEL.—H. W. Pearson gives an interesting discussion of changes in sea-level due to actual changes in the level of the ocean rather than to continental oscillations (Deformation and Variation in the Sea-Level, *Geological Magazine,* IV, 1907, 115-121). After calling attention to Playfair's law, that the ocean cannot rise or fall permanently at one place without being similarly affected everywhere, the author points out the fact that, in accordance with this law, we are accustomed to explain changes in the relative elevations of sea and land as due to actual changes in the level of the land, since the changes are not uniformly the same the world over. The propriety of such interpretation is questioned on the following ground:

According to Ferrel's law of deformation of sea-levels by ocean currents, continental masses having an ocean current impinging upon them have shore-lines higher than the average elevation of the ocean surface, due to the piling up of the waters thrown against them; while masses away from which the currents are moving have shore-lines similarly depressed. Differences in the elevation of the ocean surface in different parts of the world, due to this cause, may amount to as much as five or ten feet, or possibly more. Changes in the direction or velocity of ocean currents would result in a change of the level of the ocean surface adjacent to continental masses, which changes, not being uniform the world over, would be interpreted according to the present custom as due to land movements. There is evidence that such changes in the direction and velocity of ocean currents do take place, and that in consequence Playfair's law is not valid, some at least of the differential movements attributed to continental oscillations being really due to oscillations in the level of the sea.

The principle here discussed is of interest and value in connection with comparatively slight changes in the relative level of land and sea, and should not be lost sight of in considering apparent uplifts and depressions now in progress along the coasts of New Jersey, New England, and elsewhere. It is difficult to see how it would apply to changes in past time amounting to hundreds, and even thousands, of feet. This the author does not seem to appreciate when he dismisses the apparent motions of the earth's crust as founded on fallacious reasoning. It would seem that Ferrel's law modifies, rather than destroys, Playfair's law. Accordingly, it is not possible to sympathize with the author's feeling that Playfair's law has long put a bar upon progress, and that no man has heretofore had the courage to question its correctness. Nor will it be generally agreed that "the argument so long unassailable fails us; we find it weak, erroneous, impotent."

D. W. J.

MR. ALBA B. JOHNSON has been elected President of the Geographical Society of Philadelphia for the ensuing year.

DR. ALBERT E. JENKS, author of "The Bontoc Igorot," has been promoted to the position of Professor of Anthropology in the University of Minnesota.

MR. LAWRENCE MARTIN, who assisted Prof. Tarr in his geological studies in the Yakutat region of Alaska two years ago, has been promoted from assistant to Instructor in Geology at the University of Wisconsin.

DR. ALBRECHT PENCK, Professor of Geography in Berlin University, has been elected a foreign member of the Academy of Sciences, Copenhagen.

AMONG valuable features of the *Agricultural Journal* of the Cape of Good Hope are the monthly notes on the weather, prepared by Mr. Charles M. Stewart, secretary to the Meteorological Commission. The notes for February, for example, tabulate the rainfall data from 347 stations, giving averages for each of the eighteen districts of the Cape of Good Hope; also describe the main features of precipitation and temperature, cloud, and wind conditions and give tables of maximum and minimum temperatures, and the total quantity of rainfall at each of the reporting stations.

MR. FRANCOIS E. MATTHES of the U. S. Geological Survey, is now Inspector of topographic surveys for the western United States. Mr. Matthes's new map of the Yosemite Valley will be published some time this summer.

MR. CHARLES C. ADAMS. of the University of Cincinnati, has resigned the directorship of the museum of the Cincinnati Society of Natural History.

MR. EUGENE GALLOIS has been sent by the Paris Society of Commercial Geography to South America to make economic investigations in the Pacific Coast states, Bolivia, Argentina, and Paraguay. In Brazil he will give special attention to the coffee region.

A LONG ARTICLE by Mr. A. U. Voeikov in the *Izviestiya* of the Imperial Russian Geographical Society (Vol. XLII, 1906, Nos. 2-3), on "Distribution of the World's Population in relation to Natural Conditions and Man's Activities," is accompanied by a series of Mercator charts showing the world's density of population, the percentage of total population living in the towns, the imports and exports of breadstuffs, with chief trade routes of cereals, distribution of the production of the important breadstuffs and regions of emigration and immigration.

THE "Almanaque Brasileiro Garnier" for 1905-1906, published at Rio de Janeiro under the direction of B. F. Ramiz Galvão, has been received. The annual contains news and information concerning the progress of Brazil, the several States, the public men, etc. Maps of States and of railroad lines, photographs of public men and views of cities and towns are given.

THE *Rivista Geografica Italiana* (April-May, 1907) has a bibliography (72 pp.) of the Italian colony of Eritrea for the years 1891-1906.

THE lectures on the "Peoples of the Philippines and the Ethnology of Malaysia," recently given by Dr. David P. Barrows at the University of California, were the first regular courses of instruction given at any American University on the ethnology of those regions. Dr. Barrows will sail in July to resume his work as Director of Education in the Philippine Islands.

THE next International Geological Congress will be held in Stockholm in 1910.

DR. G. VON NEUMAYER'S library, numbering 10,000 volumes, is to be added to the library of the Gymnasium at Speyer, which contains the largest book collection in the Pfalz.

OBITUARY.

MARCEL BERTRAND, Professor in the School of Mines, Paris, died on February 1st, aged sixty years. For twenty years he had been regarded as one of the foremost geologists, and his studies relating to the origin of mountains and to dynamic geology in general profoundly influenced the science of physical geo-

graphy and led to important advances in the technique of mining. He succeeded Pasteur in 1896 in the Academy of Sciences.

DR. ALEXANDER BUCHAN, F.R.S., died in Edinburgh on May 13th, aged seventy-eight years. He won distinction in the field of meteorology and was a large contributor to the literature of that subject.

NEW MAPS.

AFRICA.

DAHOMEY.—Carte Indiquant la Distribution des Mouches Tsé-tsé au Dahomey. *La Géographie,* No. 3, 1907.

A sketch map showing twenty comparatively small districts in Dahomey where the tse-tse fly is found. The fly affects the distribution of domestic animals and imported horses and cattle are usually acclimated with difficulty or cannot live where the insects are found. The map illustrates a study on these flies in Dahomey by Mr. Henry Hubert. As the insects are met with only in small areas, Mr. Hubert's investigations may encourage efforts to exterminate them.

EGYPT.—Egypt. Scale, 1:50,000, or 0.7 statute mile to an inch. Sheets: I-II, N. E.; III-III, N. E.; XIV-II, S. E.; XV-I, II, S. E.; XVI-II, III, S. E.; XVII-II, III, IV, S. E.; XVIII-III, IV, S. E.; XIX-III, IV, V, S. E.; XXX-VIII, S. E. Survey Department, Cairo, 1906.

The Survey Department is making rapid progress with this topographic map of Egypt on a scale of 1:50,000. One of the most notable features of these sheets is the complete information they give concerning the water supply and drainage canals. The finished map will give a complete view of the irrigation development in Egypt. The hydrography, including the canals, is in blue, the names and all cultural features, excepting the canals, are in black, the hills are brown, and the desert white with thin, brown stipple.

IVORY COAST.—Reconnaissances effectuées en 1904, 1905, et 1906 dans la Haute Sassandra. By Administrator Thomann. Scale, 1:500,000, or 7.8 statute miles to an inch. *Bull.* of the Committee of French Africa, Paris, May, 1907.

This black-and-white map shows the surveyed course of the upper Sassandra, but indicates only the approximate courses of its tributaries. It gives a large number of place-names, but no relief features. The map is the outcome of the diligent researches by Mr. Thomann, described by him at length in *Renseignements Coloniaux* No. 2, 1907.

NORTHERN NIGERIA.—Karte des Gebietes zwischen Ibi und Yola. Scale, 1:750,000, or 11.84 statute miles to an inch. By H. Marquardsen. *Pet. Mitteil.,* Vol. 53, No. 5, Gotha, 1907.

Most travellers have used the Benue water route between Ibi and Yola, with the result that the region between this river and the Cameroons boundary has been little known. The map records the data collected by Captain Marquardsen in this territory. He shows his route and the tracks of earlier travellers and indicates the forests, grass and bush lands, cultivated areas, trigonometrical points, mountains, etc., on his route. Figures show approximate heights above sea-level.

SAHARA.—Esquisse Géologique du Massif de l'Aïr et de la Région de Zinder. Par R. Chudeau. Scale, 1:1,250,000, or 19.7 statute miles to an inch. *La Géog.*, No. 5, Paris, 1907.

Eight tints show the geological formations, the larger part of which were established by Chudeau's surveys. The elevations depend upon the observations of Foureau and Chudeau's barometric observations. The region included lies between 14° and 21° N. Lat. and 4° and 10° E. Long. Five itineraries of explorers, military posts, wells, and other information are given.

AMERICA.

U. S. HYDROGRAPHIC CHARTS.

Pilot Chart of the North Pacific Ocean, June, 1907.

On the reverse is printed the storm-signal repeating code of the China Coast Meteorological Service, with its request that vessels will assist in the work of passing on the weather warnings they see to repeating stations and other vessels.

Pilot Chart of the North Atlantic Ocean, June, 1907.

MARYLAND.—Three Maps of Cecil County. Accompanying volume IV (Cecil County) of the County Series dealing with the physical features of the several counties of Maryland. Scale, 1:62,500, or 0.9 statute mile to an inch. Maryland Geological Survey in co-operation with The U. S. Geological Survey and the U. S. Bureau of Soils, 1902.

Three maps of St Mary's County. Accompanying Vol. V (St. Mary's Co.) of the County Series. Other information as above.

The maps are devoted respectively to the topography (contour interval 20 feet) and election districts, geological formations, and agricultural soils. They accompany detailed reports on the physical features of each county.

UNITED STATES.—Magnetic Chart of the Northern and Northwestern Lakes. Scale, 1:400,000, or 6.3 statute miles to an inch. Prepared under the direction of Col. G. J. Lydecker. *Bulletin* No. 17 " Survey of Northern and Northwestern Lakes," U. S. Lake Survey Office, Detroit, 1907.

Shows lines of equal magnetic dip and equal compass variation for 1907 and indicates places of large local magnetic disturbance.

UNITED STATES.—Chart of Magnetic Variations, West End of Lake Superior. Scale, 1:400,000, or 6.3 statute miles to an inch. *Bulletin* No. 17, "Survey of Northern and Northwestern Lakes," U. S. Lake Survey Office, Detroit, 1907.

Results are expressed in degrees and tenths. All variations are east of north, with the exception of a single result at Split Rock Point, marked by a minus sign.

UNITED STATES.—New Shoals in vicinity of Sister Bay and Eagle Harbor, including Strawberry Channel, Green Bay. Scale, 1:60,000, or 0.96 statute mile to an inch. *Bulletin* No. 17 "Survey of Northern and Northwestern Lakes," U. S. Lake Survey Office, Detroit, 1907.

The results of a survey in 1905, minutely covering the navigation conditions in this part of Green Bay, are produced in colours.

CANADA.—Geological Map of the Northeastern Part of the Dominion of Canada. Scale, 1:3,168,000, or 50 statute miles to an inch. By A. P. Low.

Illustrates the report on the cruise of the *Neptune* to Hudson Bay and the Arctic islands in 1903-1904. Geological Survey of Canada, 1906. (Price, 10 cents.)

The map is based upon the British Admiralty Charts, corrected by later information from Peary and Sverdrup and by the surveys made by the *Neptune* in 1903-1904. The map embraces Disco Island on the west, Prince Patrick Island on the east, Grant Land on the north, and the northern two-thirds of Hudson Bay on the south. The coasts are coloured to show our present knowledge of the geological formations. An inset on a scale of 1 mile to an inch shows Fullerton Harbour, the winter quarters of the *Neptune* and the extreme northern part of Hudson Bay.

BRAZIL.—Carte du Cours de l'Amazone depuis l'Océan jusqu'à Manaos, et de la Guyane Brésilienne. Scale, 1:2,000,000, or 31.56 statute miles to an inch. By Paul Le Cointe. *Annales de Géog.*, No. 86, Paris, 1907.

This map is an excellent addition to the cartography of the lower Amazon. It makes no pretension to show completely the hydrography or physiography of that region, but presents a large amount of comparatively recent information collected by Mr. Le Cointe during his personal surveys (1892-1906) and by fifteen or more other explorers. The compiler has been able to correct some inaccuracies on earlier maps. This is one of the few maps showing the distribution of the campos or prairies. The campos are coloured yellow, and the rest of the country, covered with forests, is white. Mr. Le Cointe has in the *Annales* an extended note on his map.

CHILE.—These charts on a scale of 1:250,000, or 3.9 statute miles to an inch, have been received from the Comisión Chilena de Límites: O'Higgins, Colchagua; Aconcagua, Santiago; Aconcagua; Coquimbo, Aconcagua; Coquimbo; Atacama, Coquimbo; Magallanes (3 sheets); Llanquihue (4 sheets); Tierra del Fuego.

The primal purpose of these charts was to show the new boundary line between Chile and Argentina. The triangulation involved in the boundary delimitation was used for purposes of secondary triangulation, so that the sheets are based upon a scientific network and are a notable improvement upon earlier maps of Chile. The land-forms are in brown wash, place-names, routes, and heights are in black, drainage and glaciers in blue. Elevations in figures are very numerous, and all routes, from railroads to paths, are given. With each sheet is a sketch showing the traverse lines and triangulation on which it is based.

ASIA.

CYPRUS.—Scale, 1:348,480, or 5.5 statute miles to an inch. Stanford's Geographical Establishment, London, 1907.

A trigonometrical survey and map of Cyprus were made in 1885 under the direction of Captain H. H. Kitchener, now Lord Kitchener, on the scale of a mile to an inch. This excellent black-and-white map is a reduction from that survey. It gives heights in feet, distinguishes Christian from Moslem villages, shows railroads and carriage roads, indicates clearly the forms of the land by hachures, and is, for nearly all purposes, a useful map of the island. It is a part of "A Handbook of Cyprus," published by Edward Stanford.

INDIA.—Carte de l'Inde Ecclésiastique. Scale, 1:4,400,000, or 69.4 statute miles to an inch. Supplement to *Les Missions Catholiques*, No. 1981, Paris, 1907.

A map in colours showing the boundaries of the Roman Catholic archdioceses,

dioceses, vicariates, and prefectures, the residences of the Archbishop, bishops and mission chiefs, giving also a good geographical delineation of the country. The missionary information is in red.

PERSIAN GULF.—Kaart van de Perzische Golf. Scale, 1:2,250,000, or 35.5 statute miles to an inch. *Tijdschrift* of the Royal Netherlands Geographical Society, Vol. XXIV, No. 3, Amsterdam, 1907.

The Gulf is shown in blue, with soundings in fathoms, heights in English feet, the contour line of three fathoms along the coasts and shoals indicated. An inset shows the mouth of the Shatt El' Arab on a scale of 1:900,000, or 14.2 statute miles to an inch, giving depths in fathoms of this navigable channel through the delta leading to the Euphrates and the Tigris rivers. A chart added to the above is a facsimile of a map of the Persian Gulf produced in 1662, with nomenclature in Persian characters.

EUROPE.

CENTRAL EUROPE.—Übersichtskarte von Mitteleuropa. Berlin sheet. Scale, 1:300,000, or 4.73 statute miles to an inch. Cartographic Department of the Royal Prussian Land Survey. R. Eisenschmidt, Berlin, 1905 (Price, M. 1.50).

About sixty sheets of this fine general map of central Europe have now been produced. For most geographical purposes a general map, scientifically made and on as large a scale as this map, is sufficient. Each sheet includes 1 degree of latitude and 2 degrees of longitude, so that in the north, near 60°, each sheet is almost quadrilateral, while in the south the form is about as 3:4. Black is used for place-names and situations, railroads, the smaller highways and heights in figures; red, for roads of the first and second class; land-forms are shown by fine brown hachuring; green is used for forests, and blue for water. The above sheet shows Berlin and its surroundings. It is a beautiful map and very easily read in all respects, although it is crowded with information.

FRANCE.—Carte Géologique de la France. Scale, 1:1,000,000, or 15.8 statute miles to an inch. 4 sheets. Ministry of Public Works, Paris, 1905. (Price, 9.50 fr.)

This beautiful map is a new edition and practically a complete recasting of the geological map of France on this scale published in 1889. Geological field study has made such progress in the past fifteen years that the first edition is no longer in touch with the present state of knowledge and surveys, especially in the mountainous parts of France. A comparison of the two editions shows that they are almost absolutely different works. M. de. Margerie has called attention to the fact that, even in regions where recent researches have scarcely modified the physiognomy of the land surfaces, as shown in the first issue of the map, the geological contours have been almost completely redrawn for the present edition. The accumulation of new details also required a larger number of geological subvisions, so that on the present sheets the divisions of the sedimentary rocks have been increased from 20 to 24 and those of the eruptive rocks from 17 to 20. It is to be regretted that, as no important progress has been made in the geological study of the Spanish slope of the Pyrenees in the past fifteen years, the information relating to that region is unrevised; but in the north the map extends to the islands in the British Channel and the southern part of England, whose most recent geological data are here expressed. Mr. Michel-Lévy, the eminent director of the Service de la Carte Géologique, is to be congratulated upon this beautiful publi-

cation, to which he has devoted much of his time for the past ten years. It is a cartographic work of the first class, and will, for a long time, without doubt, serve as a complete synthesis of our knowledge of the geology of France.

WORLD.

WORLD.—KARTE DER GROSSEN POSTDAMPFSCHIFFLINIEN IM WELTPOSTVERKEHR. Bearbeitet im Kursbureau des Reichs-Postamts. 26 pp., and Map. Julius Moser, Berliner Lithographisches Institut.

A fine coloured map of the world on the Mercator projection giving the routes of all mail steamship lines to all countries. The routes are distinguished as those of vessels bearing the flags of Great Britain, Germany, the United States, and so on. The routes of steamship companies controlled in the colonies have the symbol of the mother country. Thus the New Zealand line plying between Sydney, Auckland, and the Fiji, Samoa, and Tonga islands, is designated simply as a British line.

There are insets on a large scale of the German protectorates in the Pacific, the North Sea, the English Channel, the Mediterranean, Togo and the Cameroons, and German East and Southwest Africa. All routes are numbered to correspond with a table filling 26 large 8vo pages, giving the calling places on each route and the distances and duration of the journey to each place from the starting-point. This map, with the accompanying letterpress, is one of the most useful compilations of the kind that have appeared.

WORLD.—The Variation of the Compass for the Year 1910 (Mercator Projection). Hydrographic Office, Washington, 1907.

The Hydrographic Office utilized the sea observations made in the U. S. and foreign naval services and also the work of the Department of Terrestrial Magnetism of the Carnegie Institution and of other magnetic surveys and observatories. The reverse shows a chart indicating the amounts by which the values of the variation of the compass alter from year to year and the directions in which the changes take place.

ATLASES.

F. W. PUTZGERS HISTORISCHER SCHUL-ATLAS ZUR ALTEN, MITTLEREN, UND NEUEN GESCHICHTE. IN 238 HAUPT- UND NEBENKARTEN. BEARBEITET VON ALFRED BALDAMUS UND ERNST SCHWABE. Thirtieth Edition. xvi pp. and 87 single and double page map plates. Velhagen and Klasing, Bielefeld and Leipzig, 1906. (Price, M. 2.30.)

This standard school atlas has passed through many editions, each of which has recorded in a very complete and graphic manner the geographical phase of human history down to the year of going to press. Nothing can be added to what has already been said in reviews of the earlier editions, of the adequacy of this excellent work in the large field it occupies. Of special interest to Americans is the series of plates on which the progress of the colonisation of the western world is traced. The progressive accessions to the territory of the United States are shown in insets. One page depicts the gradual advance of European political interests in Asia from 1801 to the present day, and a page plate shows the present political partition of Africa and the railroads in operation or projected. This atlas is the most effective aid in the presentation of historical geography to the student. Every map plate is critically cited, and a great number and variety of facts are clearly presented in comparatively small space.

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ATLAS.—Hickman, A. L. Geographisch-Statistischer Universal-Taschen-Atlas. Wien und Leipzig, G. Freytag & Berndt. (1907.) 16mo. [*Gift.*]

BERLIN [and Environs]. Sheet of the Übersichtskarte von Mitteleuropa. *Scale* 1:300,000. *Size* 18 x 14½ inches. Berlin, Kgl. Preuss. Landesaufnahme. 1905. [*Gift.*]

CAPE OF GOOD HOPE, Geological Map of the Colony of. Sheets 2, 4, 45. Published by the Geological Commission, 1906–1907. *Scale* 1:238,000. *Sizes, various.* Cape Town. [*Gift.*]

CAUCASIA.—Plate I. *Scale* 1:2,027,520. *Size* [about] 24 x 24 inches. Topographical Section, General Staff. Heliozincographed at the Ordnance Survey Office, Southampton. 1906. [*Gift.*]

CHANNEL ISLANDS, Bartholomew's Reduced Survey Maps of.—Sheet containing Jersey, Guernsey, Sark, Alderney, Herm and Jethou, with General Inset Map. *Scales* 1 to 2 inches to mile. *Size* of sheet about 22 x 30 inches. Printed in colours. Folded in 8vo case. Edinburgh, John Bartholomew & Co. [1906?] [*Gift.*]

EGYPT, GENERAL MAP.—*Scale* 1:50,000. Twenty sheets: N. E., I–I, III–III, IV–IV and V; S. E., XIV–I, XIV–II, XV–I, XV–II, XVI–II, XVI–III, XVII–II, XVII–III, XVII–IV, XVIII–III, XVIII–IV, XIX–III, XIX–IV, XIX–V, XX–IV, XX–V, XXX–VIII. Cairo, Survey Department. 1906–1907. [*Gift.*]

ENGLAND AND WALES.—Ordnance Survey. Third Edition. *Scale* 1 inch = 1 mile. 6 Sheets. Average size of each sheet 18 x 22 inches. Printed in colours. Southampton, Ordnance Survey Department. 1907.

[ENGLAND.] ISLE OF MAN.—Ordnance Survey, 3rd edition. (Large sheet series), No. 17. *Scale* 1 inch = 1 mile. *Size* 23 x 28 inches. Southampton, Ordnance Survey Dep't. 1906.

[EUROPE.] REISE CHARTE von Frankfurth über Maynz und von Frankfurth über Strasbourg nach Paris. *Scale* [2 German miles to 1 inch]. *Size* 17⅜ x 11⅝ inches. Wien u. Prag, bey F. Haas. 1815. [*Gift from Dr. J. Haven Emerson, New York.*]

FRANCE, CARTE GÉOLOGIQUE de la, à l'échelle 1:1,000,000. Exécutée en utilisant les documents publiés par le Service de la Carte géologique détaillée de la France par un Comité composé de MM. Barrois, Bergeron, L. Bertrand, Marcel Bertrand [and 31 others]. M. Michel-Lévy, . . . Directeur du Service. *Size* [4 sheets joined], 42 x 40 inches. Paris, Ministère des Travaux Publics. Charles Béranger, Editeur. . . . 1905. [*Gift from the Ministère des Travaux Publics, Paris.*]

[JUBSKA BAY. Black Sea Hydrographic Expedition of 1886. Chart in the Russian Language. *Scale* not given. *Size* 22 x 26 inches. St. Petersburg, Admiralty.] 1904. [*Gift.*]

LONDON, PLAN OF.—In 4 Sections. Coloured. *Scale*, 3¼ inches = 1 mile. *Size* [each section], 32 x 24 inches. Revised to date [1906?] Edinburgh, John Bartholomew & Co. Each sheet folded in 12mo pocket case. [*Gift.*]

LOUISIANA, MISSISSIPPI AND ALABAMA, Hydrographical and Topographical Map of Parts of the States of. Compiled from the U. S. Coast Surveys. *Scale* 10 nautical miles = 1 inch. *Size* 41 x 16¼ inches. N. Orleans, Messrs. Holle & Co. 1861. [*Gift from Edwin W. West, Brooklyn, N. Y.*]

ONTARIO.—Topographic Map. Niagara Sheet, Dunnville Sheet and Welland Sheet. *Scale* 1 inch = 1 mile. *Size* [each sheet], 26 x 18 inches. Ottawa, Intelligence Branch, Dep't of Militia and Defence. 1906–1907. [*Gift from the Department.*]

PERÚ, ATLAS GEOGRAFICO DEL. Por Mariano Felipe Paz Soldan. [68 Plates and Maps.] Paris, Firmin Didot Hermanos, Hijos y Ca. 1865. [*Gift from Capt. Felix H. Hunicke, Roselle, N. J.*]

PUTZGERS, F. W.—Historischer Schul-Atlas zur alten, mittleren und neuen

Geschichte. In 238 Haupt- und Nebenkarten. Bearbeitet und herausgegeben von Alfred Baldamus und Ernst Schwabe. 30 Auflage. Bielefeld und Leipzig, Velhagen & Klasing. 1906. 8vo. [*Gift.*]

[Rome.] Pianta Topografica della Città di Roma. Coll' aggiunta delle nuove Fabriche e scavi eseguiti a tutto il 1823. *Scale* [900 French feet to 1 inch]. *Size* 25 x 18 inches. [Roma], Presso Agapito Franzetti. [1823?] Mounted on cloth. [*Gift from Dr. J. Haven Emerson, New York.*]

[Taimyr Peninsula], Anchorages on N. W. Coast. Surveyed by the Russian Polar Expedition under the direction of Baron Toll, 1900–1901. 5 Charts, various scales, on sheet 28 x 22½ inches. St. Petersburg, Central Hydrographic Office. 1906. Russian text. [*Gift.*]

United States, Parts of.—Civil War Maps, gift from Edwin W. West, Brooklyn, as follows:

[1] Sketch exhibiting the Position of Yorktown. With the Approaches. From Reconnoissance and Survey, April, 1862. A. A. Humphreys, Maj. and Chief, Top'l Engineers. *Scale* 1 inch = 1 mile. [Photo. from MS.]

[2] The Chickahominy from Mechanicsville to Bottoms Bridge. From reconnoissance Survey . . . May and June, 1862. A. A. Humphreys, Brig.-Gen. and [Chief of] Corps of Top'l Engineers. *Scale* about 2 inches = 1 mile. [Photo. from MS.]

[3] Map Exhibiting the Approaches to the City of Richmond, prepared for Maj. Gen. Geo. B. McClellan, U. S. A. Compiled . . . with additional information and reconnoissance by E. J. Allen, S. S. U. S. May, 1862. *Scale* about ⅞ inch = 1 mile. [Photo. from MS.]

[4] Sketch Exhibiting the Approaches to Richmond from Pamunkey River, from reconnoissances made May–June, 1862 . . . A. A. Humphreys, Brig. Gen. and Chief of Topog. Engineers. *Scale* 1 inch = 1 mile. [Photo. from MS.]

[5] Additions & Corrections for the "Map of a Part of the Rappahannock above Fredericksburg," April, 1863. [No scale given. Photo. from MS.]

[6] Map of a Part of Eastern Virginia, including Portions of Spotsylvania Co. & adjacent Counties. Compiled by Capt. W. H. Paine, A.D.C. 1863. C. A. Mallory, Draughtsman. *Scale* 1 inch to the mile. [Lithograph from MS.]

[Vienna.]—Verkehrsplan der K. K. Reichshaupt-& Residenzstadt Wien, G. Freytag's. *Scale* 1:15,000. Mit Plan und Strassenverzeichnis des XXI. Bezirkes Floridsdorf. *Size* 24½ x 27 inches. [Folded in 8vo case.] Wien, G. Freytag & Berndt. 1907. (*Gift.*]

[World.]—Postdampfschifflinien im Weltpostverkehr, Karte der grossen. Äquatorial-Masstab 1:47,000,000. [7 insets, various scales.] *Size* 34 x 27 inches. [With text.] Berlin, Berliner Lithographisches Institut. [1906?] [*Gift.*]

World, Wall-Atlas. Constructed and drawn under the Direction of A. Guyot. By Ernest Sandoz. *Scale* 270 nautical miles=1 inch. *Size* 8 feet x 5 feet, 4½ inches. New York, Scribner Armstrong & Co. [1865.] [*Gift from Prof. William Libbey, Princeton, N. J.*]

Various.

Baretti, Joseph.—A Dictionary of the English and Italian Languages. London, C. Hitch and L. Hawes.....1760. 2 vols. 4to. [*Gift from William B. Winterton, New York.*]

[Bibliography.]—English Catalogue of Books for 1906. 70th Year of Issue. London, The Publishers' Circular, Ltd. 1907. 8vo.

[Bibliography.]—Annual American Catalog, 1906. New York, Publishers' Weekly, 1907. 8vo.

Bigelow, Poultney.—The German Emperor and His Eastern Neighbors. [With Portrait.] New York, Charles L. Webster & Co. 1892. 16mo. [*Gift from the Author.*]

Black, F. A.—Terrestrial Magnetism and Its Causes. A Contribution towards the elucidation of the problem. (Illustrations.) London, Gall & Inglis, 1905. 8vo. [*Gift.*]

Dopp, Katharine Elizabeth.—The Early Cave-Men. (Illustrations.) Chicago, Rand, McNally & Co. (1904.) Sq. 12mo. (*Industrial and Social History Series. Book II.*) [*Gift.*]

Encyclopedia, Catholic.—An International Work of Reference on the Constitution, Doctrine, Discipline and History of the Catholic Church. Edited by Charles G. Herbermann, Edward A. Pace, and Others. (Illustrations and Maps.) In Fifteen Volumes. Vol. I: A–Assize. [All as yet issued.] New York, Robert Appleton Co. (1907.)

[Encyclopædia.] Meyers Grosses Konversations-Lexikon. 6te Auflage. Band 16, Plaketten bis Rinteln. [Illustrated.] Leipzig u. Wien, Bibliographisches Institut. 1907. 8vo.

Gannett, Henry.—Statistical Abstract of the World. First Edition. First Thousand. New York, John Wiley & Sons. 1907. 16mo. [*Gift.*]

Geinitz, F. E.—Die Eiszeit. Mit 25 Abbildungen.....3 farbigen Tafeln und einer Tabelle. Braunschweig, F. Vieweg und Sohn. 1906. 8vo. *Sammlung Naturwissenschaftlicher und Mathematischer Monographien, Heft 16.* [*Gift.*]

Lyon, T. Lyttleton and Montgomery, E. G.—Examining and Grading Grains. [Illustrated.) Boston, Ginn & Co. (1907.) 16mo. [*Gift.*]

Massachusetts Historical Society, Collections of the. 7th Series, Vol. VI. Boston, Pub. by the Society. 1907. 8vo.

Miller, D. L.—The Other Half of the Globe. Sketches and Photographs from the Southern Hemisphere. Elgin, Ill., Brethren Publishing Co. 1907. [*Gift.*]

Oldham, R. D.—Constitution of the Interior of the Earth as revealed by Earthquakes. [With figures and tables.] *From the Quarterly Journal of the Geological Society for August, 1906. Vol. LXII. pp. 456–473.* [London.] pr. 8vo. [*Gift from the Author.*]

Riddle, Joseph Esmond.—A Copious and Critical Latin-English Lexicon: Founded on the German-Latin Dictionaries of Dr. William Freund. 2nd Edition. London, Longman, Brown, Green & Longmans. 1851. 4to. [*Gift from William B. Winterton, New York.*]

Schrabisch, Hans Kurt von.—Leitfaden für Ansiedler. Berlin, C. A. Schwetschke u. Sohn. 1907. pr. 8vo. [*Gift.*]

Schulz, August.—Entwicklungsgeschichte der gegenwärtigen phanerogamen Flora und Pflanzendecke der Oberrheinischen Tiefebene und ihrer Umgebung. Mit 2 Karten. Stuttgart, J. Engelhorn. 1906. 8vo. Forschungen zur deutschen Landes- und Volkskunde . . . XVI, Heft 3. [*Gift.*]

WIEDEMANN, ALFRED. Religion of the Ancient Egyptians. With 73 illustrations from the Monuments. New York, G. P. Putnam's Sons. 1897. 8vo.

WILSON, JOHN.—An Exposure of the Hindu Religion, in reply to Mora Bhatta Dandekara . . .; A Second Exposure of the Hindu Religion, in reply to Naráyana Ráo of Satárá . . . Bombay, American Mission Press, 1832, 1834. [2 vols. bound in 1.] 8vo.

WILSON, JOHN.—The Pársí Religion; as contained in the Zand-Avastá . . . etc. [Plate.] Bombay, American Mission Press. 1843. 8vo.

BOOK NOTICES.

Die Meteorologischen Elemente und ihre Beobachtung, mit Ausblicken auf Witterungskunde und Klimalehre. Unterlagen fur Schulgemässe Behandlung, sowie zum Selbstunterricht. Von Otto Meissner. Leipzig und Berlin, 1906. Teubner. 8vo. Pp. 94. Figs. 33.

The present volume, which appears in the *Sammlung naturwissenschaftlich-paedagogischer Abhandlungen,* edited by Otto Schmeil and W. B. Schmidt, gives in outline clearly and concisely the more important meteorological facts and theories, in a manner which, as the title implies, is adapted for school use, or for home instruction. The treatment is, however, so superficial that the book could hardly serve as a text-book in any systematic course of instruction in meteorology. The author has been very successful in selecting the salient points for discussion, and the clean-cut, definite statements which are the distinguishing feature of the book are admirably adapted to fix in the minds of young pupils a good idea of the elements of meteorology. There is a brief discussion of the relation between weather conditions and organic life, and of weather forecasting. The derivation of technical terms is given in foot-notes. The illustrations are of the simplest character, but serve sufficiently well. References, except to about a dozen standard books, are not included. R. DEC. W.

Les Tremblements de Terre. Géographie séismologique. Par F. Montessus de Ballore. With a preface by M. A. de Lapparent. Paris, Librairie Armand Colin, 1906.

The search for the causes of earthquakes is as old as their observation by man, and every nation and every age has had its own theories regarding the solution of the problem. There is hardly any phenomenon of nature which has not, at one time or other, been made responsible for the origin of seismic disturbances. But all these hypotheses had the same fate—while they sufficed to explain the phenomenon in the location where they were first put forth, they gave out as soon as an application to the whole earth was attempted. All these theories can be classified as either exogenous, seeking the origin of earthquakes outside, or endogenous, seeking their origin inside, the earth's crust. Galileo was the first to recognize this fundamental distinction, but not until geology was well developed as a science could an attempt be made to solve the problem. Modern science considers earthquakes as normal incidents which accompany the natural geological processes, and makes only endogenous causes responsible for them: volcanic disturbances, tectonic re-adjustments, or the caving in of subterranean hollows. A

thoroughly scientific and comprehensive treatment of this important phenomenon will not, however, be possible without more complete material than what is now available; it will take long series of observations, continued for many years, of seismological stations evenly distributed all over the earth, to tell genuine seismic from pseudo-seismic movements, and to establish definitely the laws governing the former.

What comes nearest to this ideal requirement is to work up all the data now available, uneven though this material may be, from different parts of the globe as well as from different times. This is what has been done by Count Montessus de Ballore, who in his "Tremblements de Terre" has given us the first geography of earthquakes on a scientific basis, complete and up to date as far as our present information goes. His results are so much more valuable because they were derived strictly from his statistics of earthquakes, without any preconceived idea or hypothesis. During twenty-five years of incessant labour the author has registered and card-catalogued every earthquake known to history or science, from Greek mythology to the records of the seismograph, and, by a geographical study of their distribution over the surface of the earth, has discovered their relation to the geological configuration of the earth's crust. More than 170,000 earthquakes were thus recorded and examined. The author did not, however, find this material sufficient to establish a scale of the degrees of "seismicity" for the different regions; he says that at least five years of continued observations, covering the principal areas of the globe, would be necessary for that. From the records on hand, however, a certain parallelism of frequence and intensity may be inferred, and upon this foundation he makes the preliminary classification into seismic, peneseismic, and aseismic regions—viz., regions with frequent, few, or no seismic disturbances.

The author's work is an object-lesson on the value of the geographical method for all those who still doubt whether geography can claim to be a separate science at all. It furnishes a beautiful illustration of Ratzel's epigrammatic definition so often repeated in response to the question what was the true and distinctive characteristic of geography: "It is all in the question: Where?" The author has applied this question to his card catalogue. He put down on maps the answers which his cards gave to this question. In this way the seismic regions of the earth were definitely located. He then compared these locations with the geological structure of the respective regions. He found that the regions of greatest seismic activity corresponded everywhere with regions of young geological disturbances—viz., with the great geo-synclines of Haugk. Bedded in between the geo-synclines are the undisturbed areas, the "shields" of Suess; they are purely aseismic. The peneseismic, at last, are regions of old mountains, like the Appalachians and the European Mittelgebirge. The younger the geological disturbance, the more likely the country is to be visited by earthquakes. Three important exceptions cannot be classified under this rule: The Charleston earthquake is a perfect anomaly, for which no acceptable explanation has yet been found; the Lake Baikal region, whose earthquakes are probably due to the work of the local forces which created that basin; and the Chinese region, for which not only data are scarce but those that we have must also be used with great precaution, because the Chinese use the term "earthquake" also to denote many natural catastrophes which are not of a seismic origin at all.

It is, therefore, safe to say that, generally speaking, earthquakes are preeminently of tectonic origin—namely, due to the continuous adjustment and

readjustment of fault blocks and folds in young mountains. The independence of seismic from volcanic disturbances seems thereby definitely established.

In the special part the author takes up, one by one, the geo-morphological divisions of the earth and compares their geological and seismological conditions. He makes the following divisions: I. The North-Atlantic Continent. II. The extra-European shields: the Pacific. III. The Mediterranean Geo-syncline. IV. The circum-Pacific syncline, and subdivides them into (I) 1. The Finno-Scandinavian shield; 2, the British Isles; 3, Central Europe from the Atlantic to Silesia; 4, the Russian Platform; 5, Northern Atlantic and Arctic regions; 6, Atlantic slope of the United States and Europe; (II) 7, the Sino-Siberian continent; 8, the Australo-Indian-Malay continent; 9, the Africo-Brazilian continent; 10, the Pacific and the Antarctic regions; (III) 11, the islands of the Dutch East Indies and the Bay of Bengal; 12, Himalaya and its dependencies; 13, Nearer Asia; 14, Carpathians and dependencies; 15, Southeastern Europe; 16, Alps and Pyrenees; 17, Italy; 18, Eastern basin of the Mediterranean; 19, mouth of the Tagus and subtropical North-Atlantic; (IV) 20, the Andes; 21, the Antilles and Central America; 22, Rocky mountains and dependencies; 23, Pacific border of the Sino-Siberian continent; 24, New Guinea, Melanesia and New Zealand. Eighty-seven diagrams and sketches illustrate the text, and it is only to be regretted that the system of dots which is used to express seismicity is not uniform on the different figures; this would greatly facilitate comparisons. The three large maps at the end of the book are in themselves a concentrated expression of the author's work; they are maps which illustrate our present knowledge of earthquakes, not the author's theories; but while not drawn *ad hoc,* they contain, after all, the most convincing proof of the author's conclusions. By giving us this book, the French seismologist has laid a foundation upon which every one who takes up the subject after him will have to build. M. K. G.

Der Unterricht in der Erdkunde auf Grundlage des Landschafts-prinzipes. Ein Lehrbuch für Seminaristen und junge Lehrer. Von H. Heinze. Kgl. Seminarlehrer in Friedeberg Nm. Leipzig, Dürrsche Buchhandlung, 1904.

The book is intended for the preparation of teachers of geography in primary and secondary schools. The "Landschaft," or natural division, is made the foundation of the course, and another distinctive feature is the prominent place given in it to home geography, from which not only all geographical instruction must start, but whose strengthening and broadening is also expected as a by-product from the treatment of all other stages of the course. The author requires observation, either of the objects themselves or of good reproductions, among which globes and maps occupy a prominent place, to form the basis of all geographical instruction. The pupils must re-discover, as it were, the discoveries of scientific geography which are to become their mental property; in this thinking process the causal connections must stand foremost, so that while the pupil is instructed in regional geography he will incidentally gain a working knowledge of the general geographical laws and principles. A knowledge of the latter thus acquired is considered by the author far superior to one obtained by the systematic treatment of physical geography in the schools. He consents to the latter only at the end of the various chapters of the regional treatment when related and similar phenomena will be, by way of reviewing the subject, brought together and classified so that the system will be discovered, so to speak, by the pupils themselves

instead of being placed before them ready made on the pages of a text-book. Such teaching requires, of course, an instructor high above the level of a mere interpreter of the text-book, and nothing, perhaps, illustrates better the great difference between the rôle of the teacher in German and American schools than the author's remark that the question whether a text-book ought to be used at all in the elementary school is still an open question. To anybody desiring to inform himself on present tendencies in the teaching of geography in German schools the book will be an excellent guide. It gives, besides the practical suggestions for class room work, a complete list of the courses in geography from the ungraded country school to the "Gymnasium," an extensive list of works of reference, and lists, makers, and prices, of geographical "Anschauungsmaterial," including maps and atlases, of Germany and Austria. M. K. G.

Afghanistan. By Angus Hamilton. N. Y., Chas. Scribner's Sons, and Wm. Heinemann, 1906. Pp. xxi, 562.

Any one attempting to write a book upon Afghanistan is at a great disadvantage. He cannot visit the land with which he deals. He must rely first, upon the works of early travellers who visited the country before it was closed to foreigners; second, upon the accounts of British political and military officers connected with official missions to the Amir or with commissions for settling the boundaries of Afghanistan; and third, upon the writings of the few Europeans, chiefly physicians, who have resided at Kabul at the Amir's court. Hamilton has drawn upon all these sources; and the varying style of his book shows clearly that it is a compilation. He appears to have adopted Lord Curzon's unsurpassed work upon Persia as a model; and, as the preface states, has attempted to produce a "book dealing with our buffer state in a general manner."

The first third of the book deals with the railroads of Russian Turkestan, and has only the remotest connection with Afghanistan. Beginning with Orenburg, about a thousand miles from the Amir's dominions, the various stations of the Russian railroads are described in guide-book fashion. One feels as though he were reading a revised edition of the Russian official guide to Turkestan. The second third of the book has the merit of dealing with Afghanistan, but the style is like that of the first. It is not even written in good English. For instance, on page 282 we read of "poems handed down from posterity"; on page 284, of coins of a "lower standard to the previous issue;" and on page 291 it is said that "The position of the state was in anything but a condition of comfortable prosperity." In contrast to these passages, a few sentences from the description of Girishk on page 186 may be quoted. They furnish a fair sample of the best parts of this portion of the book, and illustrate Hamilton's point of view, which is almost exclusively military and political, although trade and statistics come in for a fair share of attention:

> The setting of the fort is quite picturesque. In the low-river lands on the south side there are charming gardens, but their walls and trees are too likely to afford cover to troops to be other than a danger. In the fort itself are two gateways; . . . standing in the main route from Herat to Kandahar, controlling the fords across the Helmund, and commanding the road to Seistan, from which it is only 190 miles distant; the richness of the surrounding region makes its early possession essential to any force acting from the Indo-Afghan border.

The amount of space which Hamilton devotes to various subjects is somewhat surprising for a book which purports to deal with Afghanistan "in a general manner." Twenty pages are devoted to the ill-equipped, unreliable army, less than two (260-261) to the physical features of the country. A description of the mountains, plains, rivers, and climate is compressed into about two-thirds as

many words as are employed in the list of forts appended to the chapter on the army. Not a hint is given of the important fact that the wild tribes among the mountains of the north and northeast are largely pastoral and semi-nomadic because the climate of their high mountains is too cold for agriculture; while in the plains and low hills of the west and southwest other tribes follow the same mode of life because the climate is too dry for agriculture. Nor is it anywhere stated that the most prosperous villages and largest towns, except Kabul, lie near the edge of the mountainous regions where the river-valleys broaden and where it is easy to practise irrigation, which is essential to all agriculture.

The last third of Hamilton's book is interesting. It begins with a bright account of Kabul, based on the descriptions of Dr. Gray and Mrs. Daly; and ends with sixty pages on Anglo-Afghan relations during the past twenty-five years. In dealing with political subjects Hamilton is at home. Unfortunately, he is so intense a Russophobe that he does not do justice to Russia. He attributes all the activities of that country in Central Asia to mere meanness and selfishness. "The policy of this country [England]," he says, "should be mistrustful of Russia always, and our attitude should be actively suspicious. In Asia,—she is our inveterate opponent and the one element of danger which never can be removed from our path." He scores Russia for planning railways in Afghanistan, and on the next page proposes that England do the same thing. He declaims against Russia's "diplomatic morality," and says that "her solemnly pledged word is instinctive with treachery;" but he seems to see nothing except good in the fact that England persuaded Abdur Rahman, the late Amir, to break his solemnly-pledged word to Russia. He overlooks the fact that Russia has conquered and pacified tribe after tribe in Central Asia, partly, at least, because they were not separated from her by any natural boundary. At the great mountains she will stop, as England has stopped at the Himalayas. Neither England nor Russia can be expected to be content with the present situation in Afghanistan while that country blocks the trade of British India with Persia, and holds the headwaters of rivers which support some of the great oases of Russian Turkestan. E. H.

Internationaler Meteorologischer Kodex. Im Auftrage des Internationalen Meteorologischen Kommittees Bearbeitet. Von G. Hellmann und H. H. Hildebrandsson. Deutsche Ausgabe besorgt von dem Königlich Preussischen Meteorologischen Institut. Berlin, Behrend & Co., 1907. 8vo. Pp. 81.

At the Southport meeting of the International Meteorological Committee in 1903, Dr. Hellmann brought forward the plan of preparing a classified collection of the resolutions passed at the successive meetings of the International Meteorological Congress and International Meteorological Committee. The Committee endorsed the proposal, and entrusted the task of preparation to Drs. Hellmann and Hildebrandsson. The present volume is the result of the labours of these two men. The resolutions are carefully classified by subjects, with references to the year in which they were adopted and to the reports in which the discussions on these resolutions may be found. All votes dealing with matters now disposed of—as, *e. g.*, the international cloud year—are wisely omitted, as are those which are out of date because overridden by more recent ones. The *Kodex* makes it possible for any one very easily to ascertain just what official action has been taken by the international authority on every subject. An excellent index (subject and author) to the reports of the various Congresses is appended to the *Kodex*, and adds greatly to the value of these reports. R. DEC. W.